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THESIS

An Examination of the Effort to Automate the Procurement System of the Navy Field Contracting System

by

Theodore A. Coyle

October 1982

Thesis Advisor: D.C. Boger

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In 1974, the Naval Supply Systems Command initiated actions to automate the procurement process within the Navy Field Contracting System (NFCS). The development project was titled, Automation of Procurement and Accounting Data Entry (APADE). By 1979, the original project was discontinued and a redesign effort was initiated. In an effort to determine the underlying reasons for the project's delay and problems encountered in

developing an Automated Data System (ADS), this thesis examines the APADE project. In addition to the reasons and problems addressed by the Naval Data Automation Command's evaluation report, the researcher concluded that the procurement procedures utilized by the NFCS activities were not defined nor standardized sufficiently to facilitate ADS development. Additionally, there was no indication that this situation was addressed or corrected during the planning phase of APADE II development. The researcher also concluded that various environmental conditions significantly impacted upon the development process.

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An Examination of the Effort to Automate the Procurement System of the Navy Field Contracting System

by

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Lieutenant Commander, Supply Corps, United States Navy
B.S., U.S. Naval Academy, 1974

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT
from the
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ABSTRACT

In 1974, the Naval Supply Systems Command initiated actions to automate the procurement process within the Navy Field Contracting System (NFCS). The development project was titled, Automation of Procurement and Accounting Data Entry (APADE). By 1979, the original project was discontinued and a redesign effort was initiated. In an effort to determine the underlying reasons for the project's delay and problems encountered in developing an Automated Data System (ADS), this thesis examines the APADE project. In addition to the reasons and problems addressed by the Naval Data Automation Command's evaluation report, the researcher concluded that the procurement procedures utilized by the NFCS activities were not defined nor standardized sufficiently to facilitate ADS development. Additionally, there was no indication that this situation was addressed or corrected during the planning phase of APADE II development. The researcher also concluded that various environmental conditions significantly impacted upon the development process.

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I. INTRODUCTION

A. NAVAL FIELD CONTRACTING SYSTEM MISSION

The Naval Supply Systems Command's (NAVSUP) charter specifically assigns them with the responsibility for the procurement of material and services throughout the Department of the Navy except as otherwise delegated by higher authority. Included within this procurement authority is the management responsibility for the Navy Field Contracting System (NFCS). The NFCS consist of field activities, located at various Naval facilities, with delegated procurement authority of various monetary thresholds. It is with the field activities that the ultimate responsibility of satisfying all the fleet purchase request depends.

It is the inherent overall mission of the NFCS to provide effective and efficient procurement services to fleet units and Naval Shore activities. This service includes supplying locally-procured standard items, non-standard material, and other services. Effective performance of the procurement function consists of providing the customer the material or service requested at the time it is needed and at the best possible price.

B. BACKGROUND

Over the last decade, a major criticism of the Navy Field Contracting System has been inadequate procurement response time (the time elapsing from submission of the end-use requisition to delivery of the needed material or service). During the early 1970s, the Naval Supply Systems Command (NAVSUP) became aware of several common problems

which surfaced during studies conducted on the procurement process. They were:

1. Lack of standardization,
2. Untimely status Information,
3. Inflexible management reports, and
4. Interface only with hard copy documents.

All of these problems impacted upon the total responsiveness of the procurement process and directly affected the mission capability of the NFCS.

In 1974, as a direct result of these studies, NAVSUP initiated actions to automate the procurement process at the major NFCS activities. These are comprised of the Naval Supply Centers (NSC) and Naval Regional Contracting Centers (NRCC). NAVSUP envisioned a system that would overcome the deficiencies and enhance the response time of the procurement process.

The automated system's major objectives would be to:

1. Automate the procurement document preparation,
2. Management tracking,
3. Control of non-standard requisition documents,
4. Status reports to customers,
5. Generate management statistics and reports, and
6. Automate the interface with the accounting functions.

In April of 1975, a research and development project, APADE I (Automation of Procurement and Accounting Data Entry), was initiated. Although the R&D effort met with limited sucess, it demonstrated a definite need to automate the procurement process. By 1977, NAVSUP directed that system development, APADE II, be initiated with a total system package scheduled for completion on April of 1979.

In November 1979, with only partial development and implementation at two prototype sites completed, the Chief of Naval Operations recommended to NAVSUP that further development and implementation be discontinued until the Automated Data System (ADS) plan was rewritten and hardware requirements analyzed. The new development effort was to be accomplished in accordance with the current directives on the Navy's Automated Data System Program.

C. OBJECTIVE

It is intended that the presentation of this Thesis will serve three major objectives.

First, through the presentation of a documented record of the major efforts to automate the procurement process within the NFCS, the underlying reasons for the project's delay and the problems cited by the Naval Data Automation Command's project evaluation report will surface.

Secondly, and perhaps more importantly, by describing the various phases of development of the APADE project and comparing them to a recommended ADS development process, valuable insight of the problems involved in designing, developing, and implementing an automated system will promote improved managerial decisions concerning automation.

The final objective is to contribute an overall benefit by presenting a documented historical record of the events to facilitate the current automation effort of the procurement process.

D. SCOPE

The effort to automate the NFCS procurement process has covered a minimum of eight years. Over that time period, there have been seven commands within the Department of the

Navy, four private contractors and the General Service Administration (GSA) associated with the project in one form or another. It is impossible to record, within a reasonable amount of time, all of the correspondance and documentation which transpired during that period. Accordingly, this study examines the key documentation and correspondance submitted and received by the Fleet Material Support Office (FMSO), in the role as Central Design Agency for the project; the GSA involvement; the role of NAVSUP as the project manager; and, finally, the utilization of a private contractor to design, develop, and implement the system.

Additionally, to provide a sound basis from which to examine the automation effort, this paper will initially focus on two specific areas. The first area to be examined will be the role of the NFCS and the procurement process at the major activities. The second area will be the evolution of the Navy's Automated Data System program and applicable regulations in effect during the automation effort.

E. METHODOLOGY

The research of the subject was first initiated after a telephone conversation with the Executive Officer, Fleet Material Support Office(FMSO) Mechanicsburg, Pennsylvania on 23 February 1982 indicated that the researcher's next duty assignment would be at FMSO as the APADE project officer. The Executive Officer stated that a historical research of the APADE effort could provide valuable lessons for future managers of the Navy's resources in addition to providing the researcher with the required insight to assume the new duties.

Data was collected on three levels; (a) field research at Naval Supply Center Oakland, FMSO, and Naval Supply Systems Command, Washington D.C.; (b) Discussions and phone

conversations with various agency personnel; (c) research as indicated in the list of references.

F. THESIS ORGANIZATION

The format described in the table of contents was chosen because it seems to present the material in a logical sequence. Chapter One is the introduction and consists of a brief discussion of the automation effort with the scope and objective of the research effort. The methodology of collecting the data is also provided. The next chapter is devoted to the discussion of the role of the NFCS within the NAVSUP organization. A detailed explanation of the procurement process and the problems encountered are also presented. Chapter Three provides the reader with insight of the Navy's ADP Program, its objectives and the laws and regulations that control it. The fourth chapter is a detailed analysis of the automation effort as examined from various correspondance, files, publications and interviews. Chapter Five discusses the NAVDAC evaluation and constraints placed on the project by the CNO. Chapter Six contains the researcher's conclusions.

II. NAVY FIELD CONTRACTING SYSTEM

As mentioned in the introduction, to facilitate the examination of the effort to automate the procurement process within the Navy Field Contracting System (NFCS), it is essential to first focus on the organizational characteristics and functional requirements of the system.

A. BACKGROUND

The Navy Field Contracting System, under the cognizance of the Naval Supply Systems Command (NAVSUP), consists of all contracting offices of Naval activities except the following:

1. Automatic Data Processing Selection Office,
2. Office of Naval Research its Branch Offices and its Resident Representatives,
3. Military Sealift Command and its field activities,
4. Marine Corps and its field activities; however, its air stations are a part of the NFCS,
5. Headquarters, Naval Air Systems Command, its Naval Plant Representatives Offices and its Naval Aviation Logistic Center, Commercial Rework Department,
6. Headquarters, Naval Sea System Command, its Naval Plant Representative Offices and its Supervisor of Shipbuilding, Conversion and Repair,
7. Headquarters, Naval Electronic System Command, and
8. Headquarters, Naval Facilities Engineering Command and its field activities [Ref. 1: p.1-401.51b].

In total, the NFCS is comprised of several hundred individual activities, each having a limit to their purchasing

authority as perscribed by the Naval Supply Systems Command(NAVSUP).

Centralized control is provided by the establishment of nine geographical procurement regions throughout the world. Six of the regions are located within the Continental U.S. with the remaining three being Hawaii, Far East, and Europe. Each region has a Naval Supply Center(NSC), Naval Supply Depot(NSD), or Naval Regional Contracting Center (NRCC), formerly known as Naval Regional Contracting Office (NRCO), designated as the cognizant contracting office for that region. It is within this organizational framework that NAVSUP centralizes the buying by region, area, or commodity to the maximum extent possible.

B. CATEGORIES OF PURCHASING ACTIVITIES

NAVSUP categorizes purchasing activities by defining them by the type of authority and responsibility they have with respect to purchasing. The three categories are: (1) central buying, (2) noncentral buying, and (3) limited buying.

1. Central Buying

There are three different levels of centralized buying. The first level is regional buying. The activites designated for regional buying are the NSC's and NRCC's. They are responsible for buying items assigned by NAVSUP and for making purchases which exceed the limited purchase authority of the activities within their jurisidiction. In addition, for activities designated as the regional contracting office for their region, the responsibility of assisting NAVSUP in meeting the functional and nonfunctional management requirements is assigned. This includes, but is not limited to:

1. Providing guidance and technical assistance,
2. Evaluating staffing, performance, and effectiveness of NFCS contracting offices,
3. Determining compliance with applicable priorities of law and regulations, and
4. Assigning contracting officer authority for NFCS activities and personnel.

The second level of centralized buying is area buying. These are Navy field activities, designated by NAVSUP, responsible for purchases which are in excess of the contracting authority granted to other Naval activities located within a particluar area. Currently, there are seven area buying activities located within the Continential U.S. They are:

1. Naval Air Station, Jacksonville, Fla.,
2. Naval Air Station, Pensacola, Fla.,
3. Naval Air Station, Corpus Christi, Tx.,
4. Naval Shipyard, Portsmouth, N.H.,
5. Naval Supply Center, Puget Sound, Wa.,
6. Naval Supply Center, San Diego, Ca., and
7. Supply Department, Naval Administrative Command, Naval Training Center, Great Lakes, Ill.

Additionally, the area buying activities will make purchases which are within the authority of the activities they service when it is advantageous due to complexity of the purchase or their additional capabilities are required.

The third level of centralized buying is commodity. This level of buying is only performed by the NAVSUP managed inventory control points(ICP's). Purchasing by ICP's is usually for new stock requirements and system stock replenishment for support of major systems throught the Navy. The activities designated as inventory contol points are:

1. Navy Aviation Supply Office,
2. Navy Ships Parts Control Center, and
3. Navy Resale and Service Support Center.

2. Noncentral Buying

In general, activities designated as noncentral buying activities are responsible for buying supplies and services in support of their assigned mission as well as for local use. Purchases are made within the monetary limits as imposed by NAVSUP. Examples of noncentral buying activities are: Naval Shipyards, Naval Air Development Centers, Naval Weapons Centers, and Naval Construction Battalions. The imposed purchase limitation is usually $100,000 with the exception of Naval Shipyards engaged in the Naval Nuclear Propulsion Program. They have unlimited purchase authority within their mission area.

3. Limited Buying

Limited buying activities are those designated in writing by NAVSUP assigning purchase authority and types of purchases allowed. Examples of these activities are Commissary Stores, Naval Reserve Office Training Corps, and Naval Health Sciences Education and Training Command.

C. PROCUREMENT PROCESS

For the purpose of analyzing the procurement process within the NPCS, attention will be focused on the regional buying activities (NSC and NRCC). The reason for analyzing the procurement process at the NSC and NRCC is two-fold. First, the majority of the automation effort has concentrated on analyzing the procurement process at the regional buying activities due to the large volume in procurement actions. Secondly, it provides a better understanding of

the magnitude and scope of the overall procurement process in the NFCS by examining the organization and functions of these two activities.

1. NSC and NRCC Organization

Although the NSC's and NRCC's are responsible for performing the same procurement mission and governed by the same purchase regulations, there is a significant difference in their organizational composition to accomplish that mission. The NSC procurement component functions as a department within that activity as contrasted to the autonomous NRCC. These relationships are exhibited by Figures 2.1 and 2.2.

a. NSC Purchase Department

The purchase department in the standard NSC is comprised of three separate divisions which share the overall responsibility to plan and conduct purchase and contract administration operations for the activity. The following is a brief discussion of those divisions' responsibilities within the organization.

Buying and Order Division

The Buying and Order Division is responsible for:

1. Reviewing purchase request,
2. Determining types and methods of purchase,
3. Reviewing qualifications of contractors,
4. Performing bid analysis,
5. Performing negotiations with contractors, and
6. Placing orders under established federal contracts.

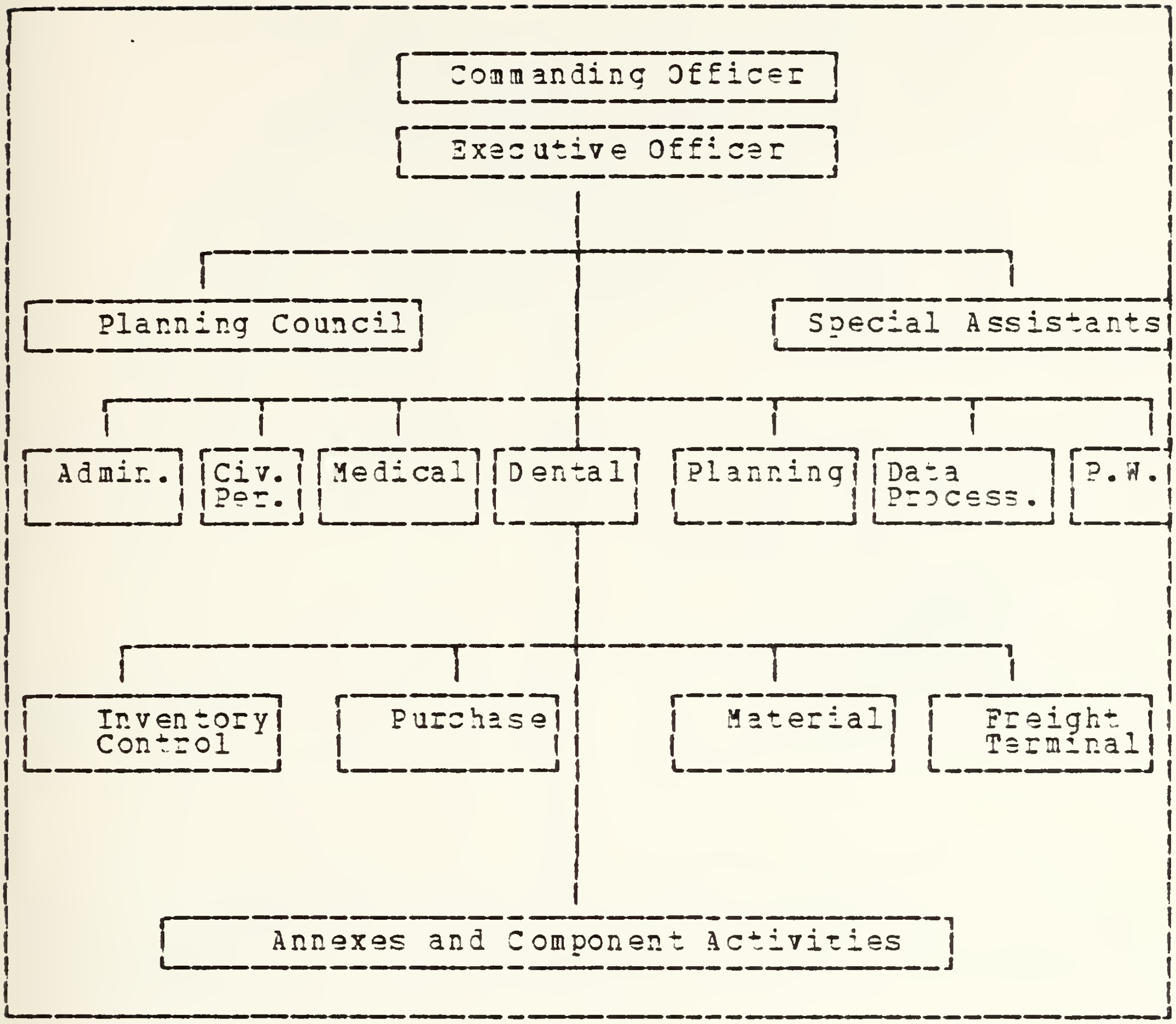

Figure 2.1 Standard Organizations for NSC and Depots (NAVSUP Man. Vol.I)

Purchase Service Division

The Purchase Service Division is responsible for preparing and issuing all invitations for bids and request for proposals as directed by the buying and order division. In addition, they maintain records of bids received, assign purchase request to cognizant buyers, prepare and issue all contractual documents, maintain control records, and prepare statistical procurement reports.

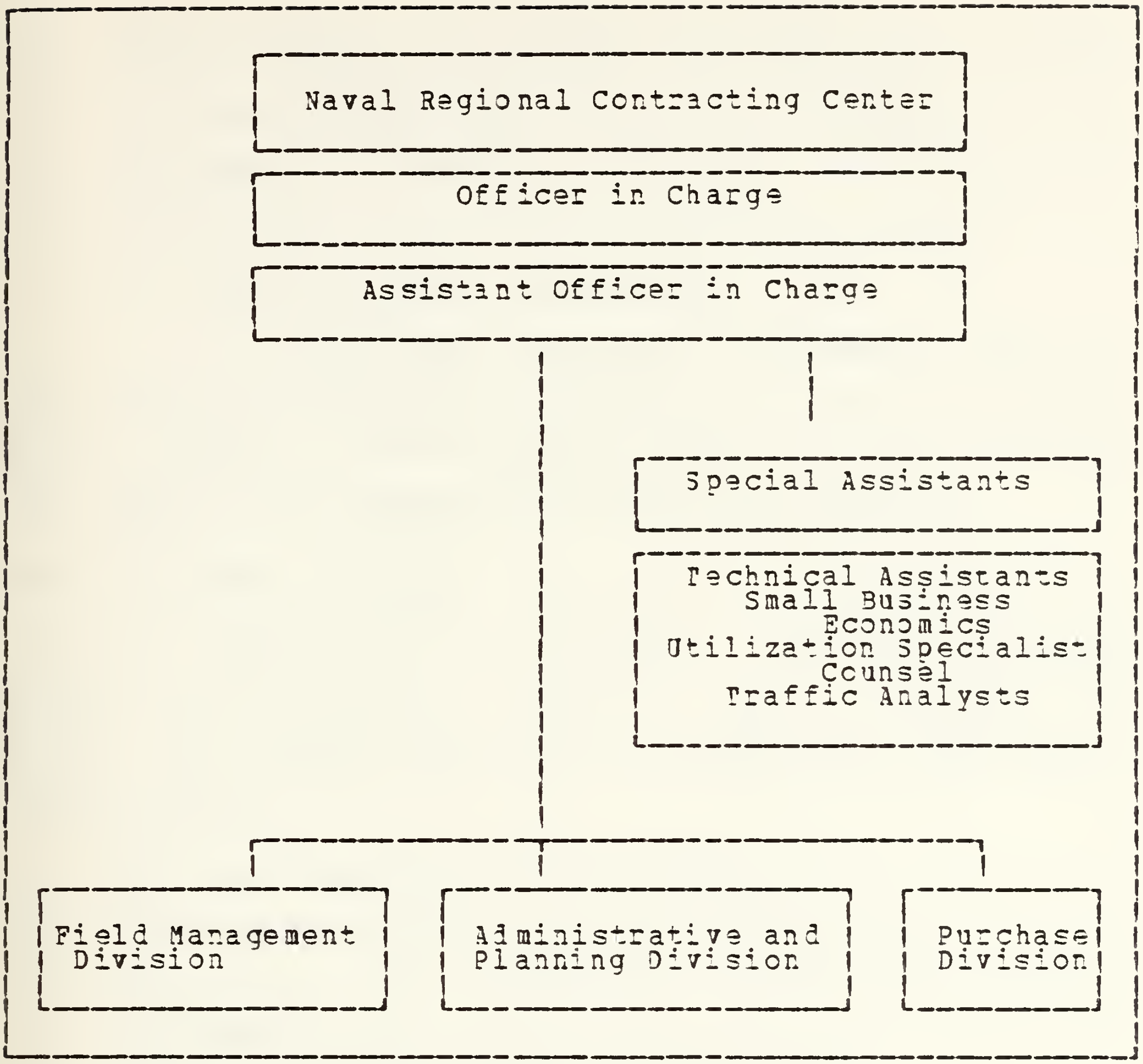

Figure 2.2 Standard Organization for NRCCs (NAVSUP Man. Vol.I)

Contract Administration Division

This division is responsible for administration of the contract once it is awarded. They issue change orders and obtain written acceptance of contractors to amendments and modifications. Additional responsibility includes:

1. Amend, modify, and terminate contracts due to default;
2. Collect, assemble, analyze, and promulgate contractor performance data; and
3. In cases of delinquent deliveries, effect contractor discipline.

b. NRCC Purchase Organization

As previously mentioned, the NRCC's carry out their assigned mission as a completely autonomous organization. However, like the NSC's, they have three divisions that share in the responsibilities of that mission.

Field Management Division

This division provides the purchase management guidance, assistance, and advise to the NFCS activities within their cognizant regional areas as delegated by NAVSUP. The general duties of the division are comprised of the following:

1. Appraise organization and staffing,
2. Evaluate levels of contracting authority,
3. Administer and coordinate purchasing training programs,
4. Prescribe standard operating procedures,
5. Advance planning,
6. Analyze purchase statistics, trends, workloads for management effectiveness, and
7. Determine the need for indefinite delivery type contracts for common type items.

Administrative and Planning Division

The administrative and planning division performs administrative, planning, personnel, office service, and purchase support services such as:

1. Analyzing internal operating methods,
2. Administering various management improvement programs,
3. Estimating budget and personnel ceiling requirements,
4. Preparing and maintaining administrative directives,
5. Providing mail, filing, and duplicating services,
6. Screening, recording, and routing all incoming purchase request,
7. Preparing and mailing invitation for bids (IFB) and request for proposals (RFP),
8. Maintaining contract files,and
9. Preparing external statistics and procurement reports for the activity.

Purchase Division

The purchase division of the NRCC plans and conducts the purchase and contract administration functions for the activity. That responsibility includes the following:

1. Reviews purchase request for correctness,
2. Analyzes and evaluate bids and proposals,
3. Directs the issuance of IFBS and RFPs,
4. Conducts contract negotiations,
5. Participates in pre-award surveys,
6. Determines contractor responsibility, capacity, and performance status,
7. Determines when to award, amendment, claim, and terminate contracts, and
8. Performs contract administration functions.

2. NSC and NRCC Procurement Process

Basically, the overall procurement missions of the NSC's and NRCC's are identical. They are both responsible for satisfying the purchase requirements of the fleet as

well as all purchase requirements exceeding the limited purchase authority of other Navy shore activities within their cognizant geographical region. They have both been granted unlimited purchase authority by NAVSUP. The information requirements, regulations, functions, and procedures of the NSCs and NRCCs to carry out these responsibilities are governed by the Defense Acquisition Regulations (DAR), Navy Contracting Directives, the NAVSUP Field Purchasing Manual (NAVSUP P-467), NAVSUP policy guidance, and locally-developed instructions.

Although the NSC's and NRCC's are organizationally different, the basic procurement functions of these activities are sufficiently similar to be described by one generalized information flow. This is graphically displayed by Figure 2.3.

Processing starts with the receipt of a purchase request at the procurement office. Requisitions are usually received in the form of a hard-copy document or punched card. Specifications, drawings, and other supporting documentation will be provided as required. A control desk is usually established to manually log-in each document by requisition number, date received, dollar value, and description. The requisitions are then sorted according to a customer assigned priority number. They are screened for completeness, consolidated when appropriate, assigned a Control Number, and placed in folders. The control desk determines the commodity and assigns the appropriate buyer or organizational code depending on local criteria. The buyer receives the requisition and reviews it for completeness and accuracy.

At this point, the next procedure depends on the estimated value of the procurement action. For small purchases, under $10,000 (Changed to $25,000 in April 1982),

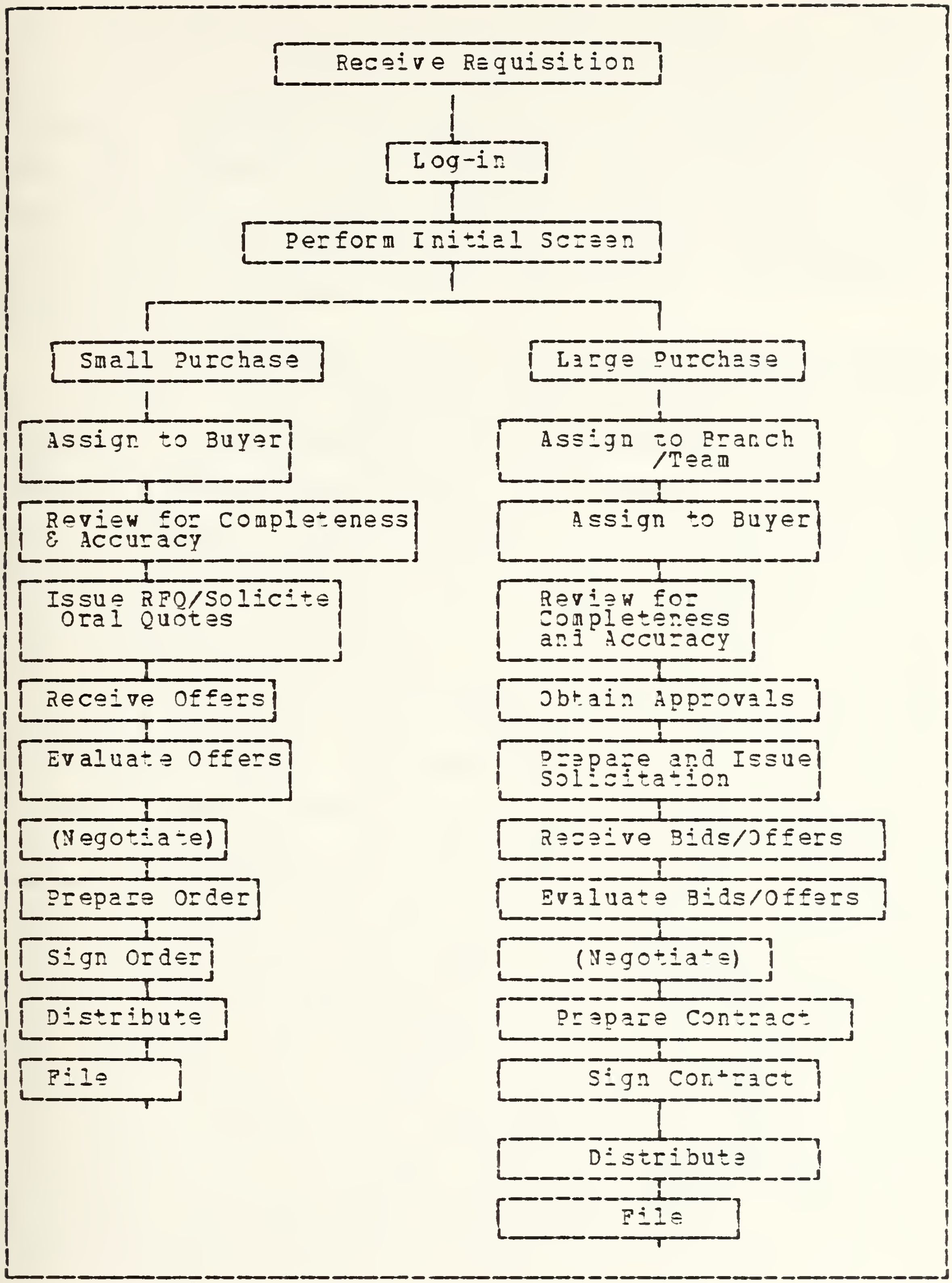

Figure 2.3 Procurement Process (Ref. 2)

the buyer will issue a Request For Quote (RFQ) or obtain an oral quotation since the regulations allow him/her to perform the procurement by negotiation vice formal advertisement. However, for procurements exceeding the $10,000 ($25,000) threshold, the buyer must either issue a formal Invitation For Bid (IFB) or obtain approval from a higher level to negotiate the procurement. After determining the method of procurement, IFB or negotiation, the process is basically the same.

After the buyer receives the offers from prospective contractors, those offers are evaluated and contracts are awarded or order placed with the successful vendor. The contract documents are signed, distributed, and filed for use by personnel administrating the contract until all action is completed and the vendors invoice is paid. Additionally, regulations require that these files be kept for a period of seven years.

It should be understood at this point that this discription has been highly simplified to enhance the reader's understanding. The regulatory requirements and the procedural details dealing with contract preparation, evaluation, negotiation, and solicitation in conjunction with contract administration can only be fully appreciated by an indepth study of the laws and regulations of government procurement. Since this examination is concerned with the automation of the procurement process, an indepth study of this magnitude is considered beyond the scope of the research. However, a list of the required input, output, and report documentation should provide the reader with an appreciation of the scope of the procurement process. Appendix A provides a list of the major input, output and, report documents required by these two Navy activities.

D. PROBLEM AREAS

In the early 1970s, several studies of the government procurement process were initiated. This mainly stemmed from the 1972 Report to Congress from the Commission on Government Procurement. Because of the increased emphasis placed on government procurement, the Navy began to perform evaluations at its procurement activities in order to surface and correct potential problem areas.

One of the first problems identified at the NSC's and NRCC's was inefficiency due to highly labor-intensive procurement actions with relatively little data processing support. All document preparation and file maintenance was done manually. The data processing support received by the NSC purchase function was provided by a different organizational component of the Supply Center. This required the sharing of large-scale equipment which supported a wide range of functions. Although the NRCC's had more control of their data processing resources, they were limited in size and capacity [Ref. 2: p.4.1-2].

A second problem identified was the lack of standardized procedures. Although both activities are governed by the same laws and regulations, the manner in which they interpreted the regulations and methods employed in enforcing the regulations varied considerably. A major reason for this was the different types of supplies and services procured by each activity. Another problem identified was the untimely flow of information on the status of the procurement actions. Customer queries for status are handled by the buyers who must divert their time from the buying action to perform mundane document searches. This resulted in searches being performed whenever the buyer could "get to it" [Ref. 2: p.4.1-3].

The inability of the current procurement system to interface effectively with the other DOD and Navy financial, supply, and contract administration systems surfaced as another major weakness. The majority of interfacing was through copies of contract documents and other non-machine-processable media. This usually resulted in additional errors and sometimes the non-reconciliation of financial accounts and untimely information.

Other problems identified were delays in the preparation of formal procurement documents and manual entry of procurement data with a high incidence of duplication.

As these problem areas were identified, NAVSUP began to understand why the effectiveness of the NFCS was diminishing. Collectively, the problems created excessive response time in the processing of procurement actions. This lead to a reduction in mission performance and customer dissatisfaction. NAVSUP, in 1974, initiated action to automate the procurement process in an attempt to find a solution to their problems. However, they first had to rely on the Navy's ADP Program.

III. NAVY'S AUTOMATED DATA PROCESSING PROGRAM

A. BACKGROUND

As John Mauchly and J.P. Eckert constructed the first all-electronic computer, ENIAC, in 1945, little could they have realized the total proliferation of computers within the federal government thirty years hence. The first computers installed in the government were mainly used to support research projects within DOD. The first general purpose or business use of a computer was by the Bureau of Census to compile the 1950 census data. By 1965, the number of general purpose computers utilized by the federal government increased to 2,412 with a data processing price tag over $1.132 billion. This significant increase in volume was mainly attributable to the employment of general purpose computers in the fields of material, financial, and administrative management. By 1977, there were over 11,000 general purpose computer systems in operation within the government [Ref. 3: p.1].

1. U.S. Navy

A major user of computer technology within DOD is the Department of the Navy (DON). From 1959 to 1975, DON had spent more than 2.8 billion dollars for Automatic Data Processing Equipment (ADPE) and had acquired over 1100 general purpose computer systems to perform logistic and administrative functions. As of April 1982, DON had a total of 2728 systems and approximately 14,634 personnel associated with the operation and maintenance of those systems. The DON 1983 fiscal year budget included 1.035 billion dollars for the acquisition and maintenance of ADP systems [Ref. 4].

Forecasting the future demand on computer systems, the DON established, in 1959, an Automatic Data Processing Program to control the valuable data processing resources. The program was and is today a compilation of Navy policies, objectives, plans, procedures, and principles for managing ADP resources. The program is further intended to enhance the Navy capabilities in the computer field. It provides general guidance to Navy components for technical advancement and effective, efficient, and economical use of computer equipment and techniques [Ref. 5: p.1].

The program's general guidance presents principles for long range development of the Navy's data processing capabilities as well as exploitation of computer technology, telecommunications, and management science techniques. The program is headed by the Deputy Under Secretary of the Navy (Financial Management) who is designated the Senior Policy Official (SPO) for ADP. The Chief of Naval Operations (OP-942) is "dual-hatted" as the Director, Department of the Navy ADP Management (DIR DON ADPM).

2. Objectives and Principles of the Program

THe Navy's ADP program objectives were officially established through the promulgation of a general plan by the Secretary of the Navy (SECNAV) in 1959. The major objectives outlined by that plan were:

1. The combining of the automated management information systems to form an aggregated system termed, "a Department of the Navy management information system,"
2. The systematic evolution and application of automatic data processing equipment and associated techniques in improving information flow to and from management with optimal uniformity, compatability, and responsiveness,

3. The development and exploitation of automatic data processing equipment and related advanced scientific techniques, and
4. The orderly development of standardization to improve information interchange [Ref. 5: p.2].

Included in the general plan were the policies, principles, concepts, and procedures to be followed to ensure proper implementation of program objectives by the various Navy organizations. It provided major stages of system development and detailed instructions for conducting planning and feasibility studies. Further guidance was provided concerning the policy of system design, acquisition, installation, and conversion of ADP systems. In addition, the plan outlined general principles dealing with the need for:

1. Preparing economic analysis to determine benefits of automation and its impact on direct and indirect cost,
2. Exploiting the full capabilities of available equipment and the management sciences,
3. Automating applications which have a legitimate history and purpose with consistency and prudent speed, and
4. Continuously anticipating and implementing reorganization [Ref. 5: p.2].

By 1965, the growth in computer technology and widespread use of computers by the government began to create new problems, many relating to the rapid technological changes in the ADP field. In an attempt to deal with these problems and "fix responsibilities within the government for coordinating purchase, lease, maintenance, operation, and utilization of ADPE by federal departments and agencies", Congress passed Public Law 89-306, commonly known as the Brooks Bill, on October 31, 1965.

After the passage of the Brooks Bill, SECNAV reaffirmed the objectives of the Navy's ADP program through the issuance of SECNAV Instruction 10462.7B in March of 1966. This instruction reiterated the general concepts, purpose, and principles previously addressed in 1959.

By 1970, DOD began to stress improved management of the use of ADP resources by the various Military Departments. Because of this newly kindled interest by DOD, DON modified their ADP program. They began to emphasize better planning, costing, and control of system development. At the same time, the major program objectives became more generalized stating the need for the exploitation and cost-effective use of automated data processing in addition to effecient acquisition and management of its resources [Ref. 5: p-2].

As more attention was focused on the utilization of ADP resources, the rules and regulations that governed those resources began to multiply.

B. LAWS AND REGULATIONS

1. A Federal Law

Public Law 89-306 (Brooks Bill) was the first substantial attempt to provide legal guidance to the government for the economic and efficient utilization of ADP resources. The bill stipulated that administrative responsibility would be divided among three separate agencies. The General Services Administration (GSA) in a major role, was given authority to acquire, operate, fund, and dispose of ADP items addressed in the legislation. Additionally, GSA was directed to act as the "day- to-day" manager of all ADP resource acquisitions [Ref. 6: p-2]. The Office of Management and Budget (OMB) was given a supervisory role,

directed toward providing guidance to the federal agencies on issues of policy. They were also tasked with the responsibility of resolving any disputes arising under the bill. The Department of Commerce was charged with providing any technical and scientific advisory service relating to ADP systems.

The bill provided specific guidance to GSA in executing their responsibilities. They were:

1. GSA is given sole procurement authority for ADPE (Section 111(e)).
2. GSA is permitted to delegate its procurement authority to an agency, either on a case-by-case basis or blanket delegation (Section 111(b)2).
3. GSA is to provide regulations for reutilization of ADPE within the government (Section 111(b)11).
4. The bill is applicable to all federal agencies and not the private sector (Section 111(a)).
5. GSA will control an ADP revolving fund available to agencies without fiscal year limitations but reimbursable to GSA (Section 111(c)).
6. GSA is prohibited from interfering in an agency's use of ADPE or in agency's determination of its requirements (Section 111(g)).

After the enactment of the Brooks Bill, various federal agencies began to formulate and issue guidance concerning ADP resources within their control.

2. OMB Circular A-71

OMB, performing their supervisory function, issued Circular A-71. First, the circular directed that OMB be responsible for the overall leadership and coordination of ADP system management. Secondly, the circular tasked GSA to:

1. Provide Federal Supply Schedules for use by agencies in ordering ADPE.
2. Provide technical information to users on the capabilities and performance of ADPE.
3. Ensure the efficient utilization of ADPE.
4. Attempt to standardize purchase procedures whenever possible.

Finally, the circular tasked the heads of the various agencies with the responsibility for:

1. Agency-wide planning, coordination, and control of equipment utilization.
2. Determining ADPE requirements.
3. Cost-effective utilization of ADP systems by exploiting or merging of systems across organizational lines.

3. GSA Guidelines

Under the authority granted by P.L. 89-306 and OMB Circular A-71, GSA issued specific guidance dealing with acquisition and management of ADP resources to all federal agencies. The two primary regulations used as vehicles to implement this guidance were the Federal Procurement Regulation (FPR Section 1-4.) and the Federal Property Management Regulation (FPMR Section 101-35 thru 101-36).

Since the provisions of these regulations are applicable to DOD, their significance to the management of the Navy's ADP program becomes apparent.

a. Federal Procurement Regulation

Section 1-4 of the FPR is totally dedicated to the acquisition of ADPE, software, maintenance, service, and supplies. ADPE is defined by the FPR as "general purpose commercially available, mass produced automated data

processing components." However, FPMR defines it as "general or special purpose," which exhibits just one of several inconsistencies found in GSA guidance.

Two subparts within section 1-4 of the FPR, .1103- General Policies and 1104- Procurement Authority, require additional explanation due to their relevance with the subject of this research. Section 1-4.1103 sets forth the general policies for obtaining GSA approval prior to the acquisition of any ADPE. An agency may only procure ADPE when a specific delegation of procurement authority (DPA) has been granted by GSA. However, ADPE may be acquired without GSA approval provided that:

1. The ADPE is specifically designed for a specific application. However, ADPE on the commercial market cannot be acquired under this exception unless it is modified to such an extent as to preclude future use of the equipment for other purpose.
2. Acquisition is through a GSA requirements contract.
3. The acquisition cost does not exceed $50,000 [Ref. 7: p. 10:1-4, 1103-1].

On September 8, 1978, this section of the FPR was modified by Temporary Regulation 46, "Use of Small Purchase Procedures and Schedule Contracts for Automatic Data Processing (ADP) Requirements" [Ref. 6: p. A-3]. Items (1) and (2) were not changed by the modification; however, agencies are now permitted to acquire ADPE without prior GSA approval in the following additional instances:

1. If placing an order against a GSA schedule contract given that:
   (a) The order is within the terms and conditions of the contract,
   (b) The order is within the maximum order limitations of the contract, and

(c) The total purchase price does not exceed $300,000.

2. The total value of the procurement does not exceed $300,000 for competitive procurements and $50,000 for procurements from a single source.

Section 1-4.1104 specifies the procedures for requesting GSA approval if the proposed procurement does not fit the above exceptions. The agency must submit the following information:

1. Copies of the proposed solicitation document,
2. Estimated dollar value of the procurement,
3. Estimated system life,
4. Location of the data processing facilities involved,
5. The fiscal quarter during which the solicitation is expected to be released,
6. A listing of any unique support requirements,
7. A statement that an evaluation has been made to ensure that the the proposed procurement represents the lowest overall cost alternative to meet the need,
8. Evidence whether or not site construction is required,
9. A statement that the need to document ADPE has been documented,
10. Statement that all available resources have been screened and none are available to meet the agency's need, and
11. A thorough and complete justification, if applicable, of the requirement for a sole source acquisition [Ref. 7: p. 1-4.1104].

GSA has three options in dealing with an agency procurement request (APR). First, they can delegate the authority to procure the ADPE to the requesting agency. This is what was refered to above as a delegation of procurement authority (DPA). Secondly, they can issue a

DPA, but require that GSA maintains some type of involvement in the acquisition. Finally, GSA can conduct the acquisition themselves. Irrespective of GSA's option, action must be initiated within twenty working days or the requesting agency may assume that a DPA has been granted.

b. Federal Property Management Regulation

Sections 101.35 and 101.36 provide the procedures pursuant to GSA's function as the "day-to-day" manager of all federal ADP acquisitions. The regulation discusses such matters as leasing equipment, reutilization of excess ADPE, Federal Software Exchange Program, and the ADP revolving fund. Additionally, the regulation requires that each APR for systems estimated at over $100,000 be accompanied with a well documented system study. This study should demonstrate that:

1. The functions to be performed are essential and readily adaptable to automation,
2. An effort was made to reduce the workload of the activity before proceeding with an expansion of capacity,
3. An interim upgrade, software modification, or schedule changes cannot be accomplished to improve performance,and
4. The new system design will achieve the highest possible effectiveness [Ref. 8: p. 19].

Although GSA issues a multitude of directives dealing with ADP resources, there are two additional documents that should be mentioned. First, the Federal Management Circular provides general ADP policies to federal agencies, but supplies no specific procedures. Secondly, GSA issues Temporary Regulations which provide interim changes to the FPR and FPMR [Ref. 6: p. A-3].

It is within the framework of the regulations previously discussed that DOD and DON must conduct the acquisition and management of ADP resources. In this regard, DOD and DON have issued a myriad of instructions and directives to provide further guidance in the effective and efficient management and acquisition of ADP resources.

4. DOD Guidelines

Upon reviewing the numerous guidance promulgated by DOD, it is apparent that two instructions are extremely significant within the scope of this research. These instructions deal with the acquisition and management of ADP resources.

a. DOD Instruction 5100.40

DOD Instruction 5100.40 entitled "Responsibilities for the Administration of the Automatic Data Processing Program", was issued in 1970. This instruction designated the Assistant Secretary of Defense (Comptroller) as the administrator of the DOD ADP program. His responsibilities include developing program policies, criteria, and standardization of ADP resources throughout the Defense Departments. The Service Secretaries were required to designate a Senior ADP Policy Offical (SPO). The SPO was responsible to evaluate ADP systems before implementation in hopes of promoting effective selection, acquisition, and reutilization of ADPE.

b. DOD Directive 4105.55

DOD Directive 4105.55 (dated May 19, 1972) entitled "Selection and Acquisition of Automatic Data Processing Resources", established policies and guidance for the selection and acquisition of ADPE, computer programs, ADP

contractual services, and supplies. The directive stipulated that the decision to acquire ADP resources will be contingent on a well documented study, demonstrating that:

1. A valid information requirement exist.
2. The function or process to be performed is essential.
3. Use of ADP resources is the most cost-effective method for the performance of the function.
4. The ADP system will be designed to provide the highest practicable degree of effectiveness and operational economy.
5. The lowest overall cost alternative satisfying the requirement is determined prior to the selection and acquisition of ADP resources.

Prior to acquiring any replacement ADPE, consideration of automated data system design or redesign is required. This enables the services to exploit the existing capabilities of ADPE. Use of commercial sources for selection and acquisition of ADP resources is not permitted unless sharing or reutilizing existing government ADP resources is uneconomical or unsatisfactory. The directive further requires that development of system specifications and requirements must be independent of a particular vendor's product to avoid unfair acquisition practices.

Selection of ADPE for multiple installations is initiated when the system to be used is centrally designed, programmed, and maintained for installations concerned. The directive states that in this case, a prototype installation will be selected for initial system implementation. The remaining sites will not receive the system until the prototype system has adequately performed in its operational environment and has been reviewed and certified through established evaluation criteria.

In an effort to promote effective selection and acquisition of ADP resources, the directive required that each military department establish a professionally staffed activity. The activity would be tasked with developing solicitation documents, evaluating vendor proposals, and performing competitive selection of ADPE exceeding an estimated value of $200,000 if the equipment was leased and $500,000 if purchased. Acquisition of ADPE estimated at a lower value would be administered by the requesting activity. Additionally, the directive specified that service secretaries were responsible for approving the selection of ADP resources. This authority could be delegated only on acquisitions estimated below $500,000.

5. Navy Guidelines

Desiring to provide internal guidelines for review, approval, and procurement of ADP resources, the Assistant Secretary of the Navy for Financial Management (SPO,ADP) sponsored several instructions. Today, guidelines have been promulgated for such things as data element and code standardization, programming language standardization, ADP sharing, ADP equipment reutilization, and the management of automated data systems development just to name a few. The NAVDAC (Naval Data Automation Command) Instruction 5230.2 lists over 40 SECNAV (Secretary of the Navy) Instructions for ADP resource management.

Perhaps the most important instruction that influenced and guided the procedure used to automate the procurement process of the NFCS was SECNAVINST 5236.1A entitled "Specification, Selection, and Acquisition of Automatic Data Processing Equipment (ADPE)", dated 30 April 1974. The instruction was the Navy's product of implementing the ADP directives provided by OMB, GSA, and DOD. The instruction

also delineated the responsibilities of the DIR DON ADPM, OP-942, and the Automatic Data Processing Equipment Selection Office (ADPESO).

The DIR DON ADPM was directly responsible to the SPO for developing and promulgating plans, policies, and procedures with respect to ADP review and evaluations. He was also designated as the Source Selection Authority.

ADPESO, later designated ADPSO, was established as a direct result of DODINST. 4105.55 requiring the formation of a professionally staffed activity within each service. Initially, ADPESO was responsible for acquisition of only ADPE, but eventually they assumed responsibility for software, services, and supplies. They were also tasked with functioning as the primary DON liaison office for ADPE acquisition matters.

The instruction reaffirmed the original program policy of conducting studies prior to the acquisition of ADP resources. It emphasized that developing data processing systems and/or acquiring computer equipment must be preceded by studies which form the basis for (1) identifying information requirements, (2) determining the kind of system needed, and (3) developing specifications to select and acquire computer equipment.

The approval authority and associated monetary thresholds were also established by this instruction. The levels of approval required was based upon the monetary value of the equipment and the type of procurement action (competitive or sole source). On 12 April 1977 these approval levels and thresholds were modified by SECNAVNOTE 5230. The levels and thresholds are shown by Figure 3.1.

These then are the major instructions and regulations that governed the management and acquisition of ADP resources during the initial stages of the effort to automate the NFCS procurement process.

Type Approval	Level 1	Level 2	Level 3
A. General Purpose ADPE (Sole Source)			
Exceeds $500,000 purchase	X		
Up to $500,000 purchase		X	
Up to $100,000 purchase (non-CPU)			X
B. General Purpose ADPE (Competitive)			
Exceeds $1M purchase	X		
Up to $1M purchase		X	
Up to $200,000 purchase (non-CPU)			X
Up to $100,000 purchase (including CPU)			X

Level 1
Assistant Secretary of the Navy (Financial Management)

Level 2
Chief of Naval Operations
Director, DON ADP Management
Commandant of the Marine Corps

Level 3
Deputy Comptroller of the Navy
Director of Civilian Personnel
Chief of Naval Research
Chief of Naval Material
Chief, Bureau of Medicine and Surgery
Commander, Navy Military Personnel Command
Commander in Chief, U.S. Atlantic Fleet
Commander in Chief, U.S. Pacific Fleet
Commander in Chief, U.S. Naval Forces, Europe

Figure 3.1 DON Approval Levels and Thresholds for ADP (Ref. 8)

C. PROCESS FOR ACQUIRING ADP RESOURCES

It should be quite evident at this point that there are two separate sequential processes for acquiring an ADP system within the Navy. The first requires that the requesting command analyze and justify the proposed system. This involves exhibiting that the system meets an

operational requirement and then justification of the system's technical and economical viability. The Navy's vechicle for providing justification in conjuction with system planning is called an Automated Data System Development Plan. The plan has two parts. The first part develops and presents the economic analysis. The second part is a milestone progress report. Captain Jan Prokop in his book, Computers in the Navy, describes the plan as follows:

> The ADS Development Plan is intended to be a comprehensive, detailed justification of ADS development conversion, or major revision proposals. As such, it represents the documentation required for approval of such actions. It must therefore present a well-defined proposed course of action, with clearly identifiable goals and criteria for measuring progress, in a level of detail consistent with the scope, cost, and complexity of the effort . . . The ADS Developement plan is designed to answer these fundamental questions: (1) Where are we? (2) Where do we want to be? (3) What specific steps are we going to take? (4) Who is responsible? (5) What resources are required? (6) Is the trip worthwhile? As such, each ADS must be specifically defined, with the impact on mission related objectives quantifiably identical; costed; and proven beneficial in terms of the effectiveness with which it will satisfy the objectives of the functional operations to be supported [Ref. 9: p. 30].

The level at which this plan is reviewed and approved depends upon the cost of the system and the command sponsorship or proponent's ability to generate high-level interest in the system. This is a very significant point due to the Navy's effort in the late 70's to centralize the decisions regarding ADP policy and delegating the responsibility for implementation and review to the operational commanders. Systems receiving high-level review cause periodic management reviews of alternatives, incurred cost, and milestones. This adds to increased effectiveness in the acquisition of ADP resources. On the other hand, a low interest-low cost system is not afforded the necessary management review to ensure effective use of these valuable resources. Sometimes

this is one of the major reasons that systems fail to perform as originally planned.

Upon approval of the plans, the second process begins: the evaluation and selection of the equipment. If authority to acquire the ADPE is granted by GSA (DPA) or it comes under the exceptions previously listed, ADPSO will normally accomplish the selection and acquisition of ADP resources requiring Level I or Level II approval. NAVSUP has designated other activities which can procure ADPE. These activities are the NRCC's in Washington, D.C. and Long Beach, Ca.; and local purchasing offices of the Naval Material Command (NAVMAT) RDT&E activities as designated by NAVMAT.

IV. THE AUTOMATION EFFORT

A. BACKGROUND

As perviously mentioned in Chapter One, NAVSUP first initiated actions to automate the procurement process at the major NFCS activities in late 1974, However, they were by no means the first source to advocate or use ADP resources for the procurement function. As early as 1961, Howard T. Lewis, professor emeritus of the Harvard Graduate School of Business Administration, when describing the future of the purchasing process stated, "There will be big changes in dealing with stock, inventory, and order-placing responsibilities. This will come about as a result of better management comprehension of the nature and relationship between these activities, and a greater use of automatic data processing" [Ref. 10: p.15]. Again in 1964, J. Weding and C. Diamond addressed the issue in their article, "Buy by Computer", published in the Harvard Business Review that year. They indicated that relative to other functions within industry and government, the procurement function had consistently been slow to apply modern management techniques; therefore, use of ADP resources. They further indicated that the procurement organization should design, operate, and control their own automated system so as to obtain the type of information important for effective procurement management [Ref. 11: p. 109].

In 1966, Achelieas Kollios and Joesph Stempel in their book, Purchasing and EDP, discussed the issue of utilizing EDP in the purchasing function. In particular, they described in detail the integrated automated procurement system used at the Aviation Supply Office (ASO). This

system basically consisted of an automated ordering function integrated with financial and inventory management control programs [Ref. 10: pp. 69-90].

On 4 September 1969, NSC San Diego implemented an Automated Local Purchase Support system (ALPS). The system consisted of three major data files; (a) FSN/Part Number File, (b) Supplier Name and Address File, and (c) Automated Follow-up File. The system automated the purchasing of controlled local purchase items and items under existing contracts [Ref. 12: p.8].

By October the following year, the small purchasing function at various NSC's was being automated through locally developed systems. However, none of these systems could be classified as a complete integrated procurement management information system. During this time period, the Fleet Material Support Office (FMSO), having overall responsibility for design of uniform automated data processing procedures and programs, initiated work on a system that would integrate the fragmented programs of various activities into a comprehensive information system. The system would be divided at three different levels; (a) Inventory Control Points, (b) Navy Stock Points, and (c) Fleet Units. The development of one system applicable to these three levels was considered to be beyond the scope of the resources available at that time [Ref. 13: p.125].

Another example of automating a procurement process was exhibited by Lieutenant Kenneth Patterson, SC, USN, in his master's thesis titled, "An Information System for the Management fo Navy Procurement". LT. Patterson proposed a model that attempted to solve problems that procurement managers have in accumulation, digestion, and dissemination of procurement information [Ref. 13: p.125]. The system was called ASPIRE which is the acronym for Automated Status of

Purchase Information Recorded Electronically. It was envissioned that ASPIRE would be a totally integrated system, exportable to all procurement activities. Subsequent to the publishing of LT. Patterson's thesis, ASPIRE was implemented at NSC Puget Sound in Bremerton, Washington to undergo testing.

As the market for electronic data processing equipment and software began to expand, so did the number of systems used by NFCS major activities for the purpose of procurement. There was PROMIS (Procurement Management Information System) used at NSC Charleston and the WANG system used a NRCO Long Beach, in addition to ASPIRE at NSC Puget Sound and ALPS at San Diego. As the internal and external requirements increased and the benefits of automation became known, procurement managers began to automate the procurement process at their activities. This led to various unrelated systems, none of which were totally integrated.

By 1974, NAVSUP began exploring alternatives to improve the total responsiveness of the procurement process in addition to resolving the continued personnel reductions plaguing the various supply activities. Automation of the procurment process at the NFCS activities was considered to be one alternative solution to their problems. In recognition of this alternative, NAVSUP initiated several efforts to develop an automated procurement system, refered to as APADE (Automation of Procurement and Accounting Data Entry System).

B. APADE I

In April of 1975, a funded research and development project was initiated at two pilot test sites to determine the feasibility and cost effectiveness of converting the existing manual process of preparing formal procurement

documents to an automated system utilizing a minicomputer. The test sites selected were two inventory control points; Aviation Supply Office (ASO) and Ships Part Control Center (SPCC).

1. System

The research and development effort consisted of using Data General Nova 800 minicomputers for procurement document preparation. They were mainly RFP's, IFB's, and purchase award documents. The system worked by a typist interacting with the minicomputer through the use of a CRT display unit. The operator would answer various questions that were programmed for each type of document. The information would then be printed out by a large Spectra 70 printer. This printed document had to be reduced before being mailed out to the contractors.

2. Results

The R&D project met with only limited success. However, the test indicated that the potential existed for greater improvements in this area as well as in other labor intensive procurement functions.

As and outgrowth of the R&D project, NAVSUP tasked FMSO in December 1975 to review locally developed automated purchase systems at various NFCS and other DOD activities in addition to commercial sources for possible standardization and exportation to the NFCS. The following is a list of those systems evaluated:

1. PROMIS - NSC Charleston's Procurement Management Information System,
2. ASPIRE - NSC Puget Sound's Automated Status of Purchasing INformation Recorded Electronically,
3. WANG System - NRCO Long Beach's procurement system,

4. SAMMS - Defense Logistics Agency's Standard Automated Material Management System,
5. PADS - DARCOM's Procurement Automated Documentation System,
6. CIAPS - Air Force's Customer Integrated Automated Procurement System,
7. MOHAWK Data Sciences 21/50 System,
8. IBM PROFS Micro Computer System,
9. WANG Data Processing and Word Processing "Vs" System, and
10. Xerox's 860 Word Processing System.

FMSO reported that these unique purchase systems were not sufficiently comprehensive and that exportation of any existing system was not feasible, even for a short term.

Following the system review, the need for the design and development of an automated procurement system, which addressed the total needs of the NFCS activities became apparent. In 1976, fiscal year 1977 funds were granted under the Navy Productivity Enhancement Program to develop APADE for system-wide application.

C. APADE II

1. Project Initialization

a. Command Plan # 338

In April 1977, NAVSUP 02, Deputy Commander for Procurement Management, submitted Command Plan# 338, Automation of Procurement and Accounting Data Entry (APADE), to the Commander Naval Supply Systems Command. Subsequently, the plan was revised and resubmitted on 13 June 1977.

The purpose of the plan was to provide management information concerning the project. The overall goal

of the project, as stated by the plan, was to provide an automated procurement management system to major field procurement activities. Specifically, the plan stated that,

> The APADE project will provide an automated procurement management system to 11 NAVSUP procurement activities and 18 other major field purchasing activities with capabilities for PR/requisition tracking, automated document preparation, and management information reports. The system will also have source data automation capabilities to enable transfer of pertinent procurement data to interfacing, dependent financial and supply data systems without manual intervention. Overall effect will be to improve field procurement function, reduce cost of procurement operation, reduce procurement administrative lead time, provide more responsive support to NFPS (NFCS) customers.

Additionally, the plan listed the following tasks which contribute to accomplishment of the goal:

1. Finalize system policy concepts,
2. Develop system design specifications,
3. Identify hardware requirements and software requirements,
4. Develop requirements documentation,
5. Obtain hardware requisition approval,
6. Procure hardware/software,
7. Test and implement at prototype site,
8. Implement at remaining NAVSUP activities, and
9. Implement at designated non-NAVSUP activities.

The Command Plan specifically tasked FMSO with providing analysis, contracting, implementation and maintenance support for the APADE project. A copy of the revised Command Plan is provided in Appendix B.

Upon reviewing this plan, it is evident that the drafting of the system design specifications was estimated to take only one month. Additionally, the total system development, including acquisition of all applicable hardware and software, was estimated at six months with testing and implementation at the prototype site to be completed

only nine months after project initialization. These appear to be unrealistically short time frames, given the myriad of higher agency requirements discussed in Chapter III.

b. Organization

Following the initial submission of Command Plan# 338, the general management responsibilities within the various commands began to formalize. The responsibility of functional sponsor for the APADE project was assigned to Deputy Commander for Contracting Management (NAVSUP 02). Project Management was assigned to the Deputy Commander for Plans, Policy, and Programs Development, Financial Systems Development Division (NAVSUP 044). This Division would be responsible for planning, funding, executing, and monitoring APADE II development, initial implementation and system maintenance. NAVSUP 041, Programs Control and Development Division would provide support by scheduling and performing automated data processing reviews and assisting in the preparation of various development plans.

FMSO, as the NAVSUPSYSCOM agency responsible for design of uniform automated data processing procedures and programs, would perform the technical management of the project. They would be specifically tasked with ensuring that the Functional Description (FD) and Data Requirements Document (DRD) accurately reflected the needs of the procurement community and were precise enough to aid in system development. Additional responsibilities included those addressed in the Command Plan.

c. Systems Policy and Concepts

As required by the Command Plan, NAVSUP 02 published the Systems Policy and Concepts Policy document in Aprill 1977. The purpose of this document was to outline

the requirements for the APADE II system. The document included the following main features:

1. Purchase request(PR)/ requistion tracking/document control,
2. Automated preparation of standardized, formal procurement documentation,
3. Source data automation,
4. Procurement management information reporting,
5. Procurement interface with existing data systems, and
6. Real time, interactive processing.

Additionally, this document specifically stated that, "APADE II will provide a standardized baseline for automation of procurement processes throughtout the Navy Field Procurement System. Due to the broad range of activities involved and the significant differences in existing interrelated (e.g. supply and financial) management systems in operation at various activities, APADE II design must be sufficiently flexible to accommodate such factors" [Ref. 14: p. 3-4].

d. ADS Development Plan

In addition to the System Policy and Concepts document, NAVSUP also initiated work on the Automated Data System Development Plan during the same time frame. However, this document was not officially approved by the CNO until 12 October 1977. This document, as discussed in Chapter Three, provided the justification of the system's technical and economical viability.

The first part of the ADS plan was the Economic Analysis. In analyzing the automation of the procurement process, five alternatives were considered. They were:

1. Continue current system,

2. Contract service,
3. Share or use existing facilities,
4. Develop a central procurement system, and
5. Develop a uniform minicomputer system at each proposed site.

Alternative One was eliminated since it had previously been shown that the curent system was slow and severly impacted upon the responsiveness of the system. The second alternative was not feasible because APADE II was intended for operation by non-ADP personnel with minimal training required for system operation. It was further estimated that system operation would not exceed 0.5 person hours per activity per day. Therefore, it was not practical to contract for this small work load. Additionally, it was planned that software maintenance and enhancements would be performed by FMSO. Alternative Three was eliminated since existing facilities were considered to be saturated and did not allow the objectives of the system to be met.

Both Alternatives Four (4) and Five (5) were considered to provide equal benefits; however, the central procurement system, alternative 4, would require additional manpower for system operation in addition to expanded facilities for environmental protection. Alternative 4 was eliminated as the greater cost/equal benefit alternative.

Alternative 5 consisted of locating minicomputers at 12 operational sites plus one test bed minicomputer site. The software would be uniform across the procurement system. The system would be adaptable to volume and varying personnel requirements at the sites. Each system would have one central processor with 256K memory, multiple disk units with up to 10M bytes of storage, one magnetic tape unit, one card reader, one to two line printers, and up to 4 cathode ray terminals. The software developers would provide

turnkey programming training and would be required only for maintenance at FMSO. Some operational training was considered to be necessary, but the system could be operated by existing employees currently in the activities. The system would also produce tapes which would interface to other data bases affected by procurement operations.

Specifically, APADE II would be capable of interfacing with certain existing supply, financial, and contract administration systems as necessary. These systems include: Uniform Automated Data Processing System (UADPS-SP), Naval Sea Systems Management Information System (NAVSEAMIS), Navy Uniform Vendors Evaluation Program (NUVEP), Military Standard Contract Administration Procedure (MILSCAP), Shipboard Uniform Automated Data Processing System (SUADPS), and the Integrated Disbursing and Accounting Data Exchange (IDA-DX).

The equipment would require no special environment. The CRTs would be placed on desk, utilizing existing work space. The central processing unit (CPU), disk, and magnetic tape units would be mounted on racks. Line printers would be located near the supervisor's office. Overall, Alternative 5 was designed to meet the needs of an automated procurement system in the areas of:

1. Procurement operations,
2. Report generation,
3. Document preparation, and
4. Source data automation.

The total cost of the minicomputer system was estimated at $159.8 million, shown in Table I. Based upon an inflation rate of 4.7 percent per year, the total present value savings was estimated at $4.265 million over the estimated eight year life of the system. Payback of the investment was calculated at 1.97 years.

TABLE I

APADE Estimated Cost

COST Type	APADE	*APADE II-Project Years								Total
	I	1	2	3	4	5	6	7	8	
Development										
ADP		.3	0	0	0	0	0	0	0	.3
Non-ADP		0	0	0	0	0	0	0	0	0
Operational										
ADP	.09	16.5	17.3	18.2	18.9	19.8	20.8	21.8	22.8	156.3
Non-ADP	.04	.2	.2	.2	.3	.3	.3	.3	.3	2.1
Equipment	.11	1.4	0	0	0	0	0	0	0	1.4
Total System	.24	18.4	17.5	18.4	19.2	20.1	21.1	22.1	23.1	159.8

* Inflated at 4.7% per year (CHNAVMAT ltr. 26 Oct. 1976)

The economic analysis exhibited that Alternative 5 provided for automation of most procurement operations at a relatively low cost for equipment, software, and support.

In conducting the economic analysis, the ADS development plan projected a starting date of the first quarter fiscal year 1978. Project completion was estimated at ADS approval plus 18 months. Figure 4.1 provides the planned ADS locations with installation date and ADPE to be utilized.

The second part of the ADS Development Plan consisted of the Milestone Progress Report. This report exhibited the same proposed task and completion dates as did Command Plan# 338, Appendix B.

Location	Sets	ADPE CRT	Disk Units	Installation Date (ADS approval plus ______ months)
Developer	1	4	4	3.0
NSC Oakland	1	4	5	6.5
SPCC	1	4	5	12.0
ASO	1	4	2	12.5
NSC Charleston	1	4	5	13.0
NSC Norfolk	1	2	4	13.5
NRPO Philadelphia	1	2	1	14.0
NRPO Washington	1	2	1	14.5
NRPO Long Beach	1	4	3	15.0
NSC San Diego	1	2	3	15.5
NSC Puget Sound	1	2	2	16.0
NSC Pearl Harbor	1	2	3	16.5
NRPO Newport	1	2	1	17.0
FMSO	Development Set			17.5

*One set is comprised of one each of the following:
CPU
Core Memory
Disk Units as indicated above
Tape Unit
Line printer
Card Reader
Number of CRTs as indicated above.

Figure 4.1 Site Location and Installation Estimates (ADS Development Plan)

2. Project Approval and Tasking

On 8 June 1977, NAVSUP 044 reemphasized to FMSO the following required actions:

1. Develop system design specifications by 1 June 1977,
2. Award a contract by 6 June 1977 to identify hardware and software requirements,
3. Identify hardware and software requirements by 15 July 1977,
4. Develop requirements documentation by 30 July 1977,
5. Procure hardware/software by 30 September 1977,
6. Implement and test at NSC Oakland, and

7. Implement at remaining stock points by 30 September 1978.

Additionally, NAVSUP 044 classified the project as mandatory with an assigned priority of 7a. This priority indicated that the APADE effort was part of another major project that was seventh on a priority list of projects assigned and approved for FMSO during that fiscal year.

On 30 June 1977, the Assistant Deputy Commander, Plans, Policy and Program Development, NAVSUP 049, forwarded the approved Command Plan # 338 to FMSO's Commanding Officer for assignment of the responsibilities and tasks as previously mentioned. NAVSUP 049 emphasized the fact that NAVSUP 04 was responsible for project completion and sucess of the program hinged on the ability of NAVSUP to contract for hardware by 30 September 1977.

3. Hardware Acquisition

On 26 July 1977 a delivery order contract was issued to Systems Consultants, Inc. (SCI) as a result of an unsolicited proposal from SCI to FMSO. The contract specifically requested that SCI perform the following action if optioned by the Government:

1. Participate in technical conferences with FMSO personnel,
2. Review APADE II design specifications,
3. Develop specific equipment and system requirements,
4. Perform a survey of all available minicomputers suitable/capable of performing this task, and
5. Prepare a full system specification.

With the exception of task five, all actions were optioned and completed. SCI provided a set of general system specification instead of full system specification as outlined above.

As a result of the information provided by SCI, FMSO informed NAVSUP 049 that APADE II hardware requirements had been identified on 16 August 1977. The hardware selection was based upon a comparative analysis of minicomputer systems from the following commercial manufacturers:

1. Data General,
2. Interdata,
3. Varian, and
4. DEC

The equipment selected was the Interdata System. This system consisted of a 7/32 central processing unit (256K Bytes), 22M Bytes disk drives, 600 lines per minute printers, 400 cards per minute card readers, and video display units. Additionally, the following software package was accepted as part of the system:

1. Operating System........OS/32MT,
2. Compiler.......Cobol, and
3. Utilities........Telecommunications ITAM 32.

Data Entry ITRAC

On 30 September 1977, the Automatic Data Processing Selection Office (ADPSO) issued a delivery order contract, N66032-76-D-0004, for the acquisition of the initial hardware requirements of the APADE II system. This was performed in accordance with SECNAVINST 5236.1A, Specification, Selection and Acquisition of Automatic Data Processing Equipment. It was planned that Interdata processors and periphial equipment would be delivered, installed, and accepted at the rate of two a month until all deliveries were completed. The first deliveries started to arrive at the prototype and development sites by December 1977.

4. System Development

On 16 August 1977, in a letter to NAVSUP 049, the Commanding Officer of FMSO voiced the concern that, "we may be moving too quickly and have not yet thought out all aspects of the APADE project." One specific area of concern dealt with the application software development. There was no indication of who would accomplish this effort, i.e., FMSO or a contractor. FMSO's CO advocated contracting out this effort due to the lack of personnel at FMSO with the needed experience in this area. Additionally, he considered that application software development would take longer than the NAVSUP Command plan indicated. He stated that, "FMSO's personnel estimated a minimum of six to eight months after award of a contract for delivery of a first module, with full development taking as long as fifteen months.

The CO also addressed the issue that no formal plan had been formulated for maintenance of the system. He emphasized that FMSO would be the best choice, but specific resource requirements would be difficult to estimate until the application software was designed. In addition, he expressed concern that no formal plan presently existed for incorporating any on-line interfaces via APADE II.

a. Request for ADP Services

On 2 September 1977, FMSO submitted a request for ADP services to the General Service Administration (GSA) via GSA form 2068, in accordance with the Federal Procurement Regulations. (As described in Chapter Three, this is a request for a Delegation of Procurement Authority, DPA) The request provided the description of the minicomputer system that had been agreed upon earlier as the minimum equipment configuration. It described the software package being procured from Interdata and proposed the following personnel requirements:

1. One Team Leader Analyst,
2. Two Computer Systems Analysts, and
3. Four Programmers.

The description of requested services indicated that FMSO would provide systems specifications from which a computer system was to be designed and programs written in addition to testing, debugging, and implementation of the system at the first site. Additionally, the request provided the following system definition:

> The APADE II System shall consist of a standard set of equipment and software components configured according to the performance characteristics required by each of the thirteen (13) sites receiving the system. The standard equipment and software set shall be adaptable for each of the user sites according to the definitions and constraints specified herein.

Further, the request stipulated that APADE II would support five system functions. These functions were:

1. Procurement Tracking,
2. Procurement Record/History,
3. Document Generation,
4. Management Information, and
5. Telecommunications Interface.

Each of thes system requirements are summarized in Appendix C.

On 6 September 1977, GSA notified FMSO that it chose not to issue a Delagation of Procurement Authority. It further directed that the work would be performed through the use of an existing ADP Service Contract, negotiated by GSA, Atlanta, for the Interagency Data System Facility (IDSF) located in Huntsville, Alabama.

Since 1967, GSA has maintained the IDSF at Huntsville and administered an ADP service contract with a commercial vendor. The major function of this facility is to provide a convenient and economical source of systems

analysis and programming talent for small dollar value (less than $250,000) requirements of Federal agencies, especially when a fast start-up is desired.

IDSF functions as the project monitor. In general, they provide space, supplies, telephone, etc., to the contractor, forward contractor estimates in response to request for task order amendments, and verify contractor charges against the project task orders. However, all Contracting Officer responsibilities are retained by the GSA regional office in Atlanta.

It should be understood, that these ADP technical support service contracts are nothing more than a time and material, requirement type contract. GSA-IDSF orders labor hours at a specified rate and material at cost. This type of contract requires constant monitoring to ensure efficient and effective use of government resources.

On 8 September 1977, FMSO requested an estimate of time and cost to perform the services outlined on the GSA Form 2068 from IDSF Huntsville. The initial GSA estimate for the total APADE II application software was approximately $248,000 with an estimated completion date of April 1979.

b. Memorandum of Understanding

On 21 October 1977, a Memorandum of Understanding (MOU) between GSA-IDSF and FMSO was signed. The general purpose of the MOU was to establish a working agreement through which GSA-IDSF would provide ADP technical support services on a reimbursable basis to FMSO. Specifically, GSA-IDSF would issue task orders to the support contractor based on the work requirements and specifications submitted by FMSO. No single task order issued by GSA-IDSF could exceed $250,000 for total support cost. All

alterations and modifications of amendments required prior approval by FMSO. The performance period would be governed by the requirements and specifications for each individual task as prescribed by FMSO.

The initial task orders to be accomplished were:

1. System Specifications,
2. Data Base Requirements Document,
3. Test Plan,
4. Program Specifications,
5. Program Coding and Testing,
6. System Integration,
7. Acceptance Testing,
8. User Manual,
9. Training, and
10. Quality Assurance Program.

A summarization of each task is provided in Appendix D.

It should be noted at this time that Task One, System Specifications, was to be based upon the APADE II Functional Description being provided by FMSO.

As a result of the MOU, a project order was issued on 21 October 1977 to GSA-IDSF for APADE II application software development. Funds amounting to $198,000 were provided for the initial ten tasks in addition to an evaluation of possible use of a file management , inquiry and retrival system and telecommunications package, TAPS (Terminal Application Processing System) for use in APADE II. System predesign and software evaluation was initiated under task orders H587 and H588 by Potomac Research, Inc. (PRI), the GSA-IDSF support contractor in December 1977. Development hardware was delivered to the development contractor, PRI, by 20 January 1978. The hardware was finally installed, tested, and accepted by PRI on 31 March 1978.

c. Modular System Concept

As early as July 1977, modular system development and installation was planned for the APADE II project. This was first indicated in the 15 July 1977 preliminary system design specifications published by FMSO. The modules were:

1. Module I ...... Purchase requisition tracking,
2. Module II ..... Automated document preparation,
3. Module III .... Management Information Reports, and
4. Module IV ..... Interface with other systems.

On 15 December 1977, FMSO published the APADE II Management Plan which was prepared by Computer Data Systems, Inc. The purpose of the plan was to provide an outline of required management actions and related milestones. It would be used to plan and execute APADE II development, evaluation, operational implementation and maintenance. This plan also referenced APADE II modules in describing the implementation plan. Although modular system development appeared in both of these documents, no reference to this fact was made in the ADS development plan.

In May 1978, the Functional Description (FD) was published by FMSO after having been completed under contract with Computer Data Systems, Inc. The FD indicated that the system would be implemented in the field one module at a time. It furnished the following target dates for implementation:

1. Module I ...... August 1978,
2. Module II ..... November 1978,
3. Module III .... February 1979, and
4. Module IV ..... April 1979.

d. Module I Development

The task order (H585) under which Potomac Research, Inc. (PRI) commenced the developement of APADE II was initiated in February 1978. As previously mentioned, the task required the contractor to prepare system specifications and succeeding deliverables from the government provided FD and DRD. However, these items were not completed by Computer Data Systems, Inc. (CDSI) until 15 May 1978. Therfore, PRI's effort during the interim was based on preliminary versions of these documents in addition to direct meetings between FMSO, PRI, and CDSI personnel.

For the next four months, from February until May there were no indications of any problems with the development effort. PRI was reporting their work performance every two weeks by submitting task order activity reports to FMSO. Additionally, two meetings were conducted between the contractor and FMSO personnel during that period. On 19 May 1978 PRI indicated that they were experiencing difficulty with the TAPS package and the Interdate OS 32 editor. This was also the first time that they reported the use of over-time. As of 14 July 1978, they had not yet completed system testing of Module I. Implementation on Module I at the prototype site was scheduled to commence on 17 July 1978.

e. Prototype Testing

NSC Oakland was selected as the prototype test site because they were experiencing sever problems in the area of small purchases. During that year, approximately 58 percent of the procurement department's personnel were devoted to small purchases. They were receiving from 2500 to 3000 purchase requests per week for non-standard, low dollar-value (less than $10,000) items. This eventually

resulted in a weekly output of 1200 to 1500 award documents. Because of the manual methods employed to collect data on work load distribution, buyer production, and requisition status, management control of the procurement process involving this many requisitions was greatly reduced. Approximately 600 customer inquiries were being received weekly which proved to be a costly and time-consuming manual task [Ref. 15: p.9].

Since Module I was specifically designed to provide the management data needed to control and simplify small purchase processing, NSC Oakland would provide an excellent test of the module. In addition, NSC Oakland had budgeted for the personnel decrease associated with the productivity increase to be accrued with APADE II for both FY 79 and FY 80.

Implementation of Module I was originally scheduled from 17 July thru 28 July 1978. Although implementation was initiated on 17 July 1978, it was not fully stabilized until February 1979. This was due to several problems. The implementation suffered a series of software and hardware problems which required several changes to the initial software design in addition to requiring more hardware. FMSO reported that the software had to undergo excessive debugging during the implementation effort. This entailed many long hours of reprogramming by contractor personnel. Another problem encountered was that the GSA-IDSF ADP technical support contract expired on 30 September 1978. On 12 August 1978, FMSO was informed the follow-on contract had been awarded to Computer Sciences Corporation (CSC) and would become effective 1 October 1978. Although the majority of personnel and especially the project leader, were hired by the new contractor, it caused disruption to the implementation process.

On 2 January 1979, the contractor's project leader (the only project leader since the project initiation) abruptly left the contractor. Only at that time was it discovered that no substantiating documentation for any modules existed. The project leader had mentally controlled all development efforts and the application software without providing any written documentation of his undertakings. It required the following two months to recover lost progress and rebuild system documentation. In addition to the documentation, FMSO considered that adequate test plans and procedures had not been established nor used. It expressed that the majority of the problems encountered were discovered on site, impacting on the implementation process.

Overall, the results of the problems encountered were that prototype testing became nonexistent and implementation by trial and error was the game plan. By 20 February 1979, Module I of APADE II had been implemented at NSC, Oakland. Development on the remaining modules continued under the MOU with GSA-IDSF.

f. Second Test Site

On 12 February 1979, the Officer In Charge (OIC) of NRCO Washington, D.C. requested that Module I of Apade II be implemented at his activity. He stated that NRCO Washington had an urgent need for an improved requisition tracking system. The OIC considered that since the hardware for APADE II had been received and installed at his activity, implementation of Module I was a viable alternative [Ref. 16: p. 1].

The systems test plan required that FMSO recommend to NAVSUP 044 when a module was ready for implementation at the other proposed sites. Although this had not been done, it was decided in March that the results at NSC,

Oakland were sufficiently encouraging to justify a second prototype test at NRCO Washington, D.C. The expansion of Module I to a second prototype was justified by emphasizing the difference in procurement volume and type between a NSC and a NRCO. The NRCO mainly deals in a low volume, high dollar value environment whereas the NSC deals in a high volume, low dollar value environment [Ref. 15: p.11].

By the end of April 1979, CSC had generated the Module I system for the hardware configuration at NRCO, Washington. However, no specific test plan stating the goals for additional testing had been developed. Module I was implemented at NRCO by FMSO personnel in May 1979 without assistance of contractor personnel. The implementation effort proved more sucessful than had been experienced at Oakland. This was mainly due to the availability of a stablized software system and the volume of small purchase actions was only a fraction of that at experienced at Oakland. In addition, no increased productivity had been forecasted in NRCO's budget.

g. Contract Administration

After the severe problems encountered during system implementation at NSC, Oakland, FMSO began to monitor both GSA-IDSF and CSC more closely. Although the MOU clearly held their responsibility as tasking and funding the project, with final acceptance authority, FMSO began to become more involved with the actual contractor's performance. The following correspondance are some examples of the increased interest in administration of the contract by FMSO.

In a letter dated 20 February 1977, to GSA-IDSF, the FMSO project officer for APADE II requested that:

1. CSC review all data base, system/subsystem, and program specifications of Module I to ensure proper documentation,
2. CSC provide complete documentation for Modules II and III for review and approval before any programs are written,
3. CSC fully staff the project as exhibited in their estimates, and
4. CSC exercise greater management control to assure all programs conform to applicable standards.

In March 1979, CSC notified FMSO that the revised estimate for completion of Module II was August 1979. Since that estimate would put the project a total of nine months behind the original schedule, FMSO stated that CSC's projected completion date was unacceptable. In a letter to GSA-IDSF dated 14 March 1979, FMSO's CO indicated that although over 2950 man-hours have been reported to develop system/subsystem specifications, program specifications and other documentation on Module II through 20 January 1979, little progress has been made on Module II. He requested that it be determined what had to be done to complete Module II by May 1979. In addition, as a result of the alleged cost to date, he requested GSA audit man-hours expended versus amount of accomplishment.

The response letter from GSA-IDSF on 6 April 1979, indicated that CSC was not required to report hours expended by module since GSA issued the project as a single task order. Additionally, the estimated completion date for Module II was considered reasonable since it was being developed under a more formalized manner than Module I. This was in reference to the approvals that were required by FMSO's letter dated 20 February 1979.

It was approximately this same time period that CSC recommended implementation of Module II in two phases: A and B. Phase A would contain those capabilities and files considered a priority for implementation at NSC, Oakland. Phase B would contain the remaining files, document processing and the Integrated Disbursing and Accounting (IDA) interface. Module IIA was estimated to be completed by CSC on 31 July 1979 with implementation at Oakland in August 1979.

By June 1979, over $300,000 had been spent on the application software development. The project originally scheduled for an April 1979 completion date had no firm completion date in sight. Because of development and implementation delays, cost overruns, Naval Audit Service recommendations and requirements associated with multiple-activity standard systems, the CNO requested, "that all new APADE II initiatives be held in abeyance pending a comprehensive evaluation of the project" [Ref. 17: p. 1].

V. EVALUATION AND CONSTRAINTS

A. NAVDAC EVALUATION OF APADE II

On 11 June 1979, the Chief of Naval Operations directed the Naval Data Automation Command (NAVDAC) to conduct an evaluation of the APADE II project. He further requested that the evaluation report be completed no later than 12 September 1979. On 10 September 1979, after three months of thorough evaluation, NAVDAC reported their findings and recommendations concerning the future of the APADE II project.

1. NAVDAC Findings

NAVDAC's evaluation report indicated several areas in which serious problems had developed and contributed to the projects current condition. Those areas were:

1. Initial project planning,
2. Contractor,
3. Design,
4. Implementation, and
5. Project monitoring.

The following discussion is a summary of each problem area as reported by the NAVDAC evaluation team.

a. Initial Project Planning

Upon reviewing the initial approval process and planning of the development process, NAVDAC considered that the projected schedule was overly optimistic in that the magnitude of the APADE II project was not fully understood. Additionally, they considered the system design concepts

were not sufficiently defined to justify early acquisition of ADP hardware.

NAVDAC also indicated that a major failure in the early stages of project planning was in defining the requirements of the application software development contractor. Specifically the fact that the contractor performed software development before the Functional Description (FD) and Data Requiremnet Document (DRD) were completed. This required interpretation of the functional requirements by the development contractor and subsequently resulted in disputes as to the consistency between developed program and functional requirements. In addition, the development contractor had no procurement expertise among his personnel.

Another flaw in project planning was a lack of detailed test plans describing what tests were to be conducted and by whom. The Test and Implementation Plan did not provide for test data recording, reporting, evaluating, or approval procedures.

b. Contractor

NAVDAC considered the change of the GSA-IDSF ADP Support contract from PRI to CSC, combined with the abrupt departure of the contractor's project leader, significantly contributed to the delay in software develpoment. However, they indicated that coordination with and control of the contractor had just as much impact on inhibiting the development process. They cited the failure of GSA and FMSO to establish intermediate milestones for the contractor and GSA to monitor progress and penalize late delivery as contributing factors. Also, the geographic location of FMSO, GSA, the Development Site, and the Prototype site impeded organizational communications. To this statement, they referenced

frequent communications between CSC and FMSO concerning interpretations of the FD and system requirements without informing GSA-IDSF. This led to verbal changes, additional labor commitments, contractor claims, and disputes over the veracity of these claims.

c. Design

NAVDAC stated that the selection of TAPS as the file management, inquiry and retrieval system and telecommunications package restricted APADE II design. They indicated that designing an efficient application system in the TAPS environment required an extensive knowledge of TAPS's capabilities and limitations. TAPS was a relatively new product and both PRI and CSC had no prior experience with this package. NAVDAC reported that contractor personnel possessed only a limited understanding of the Interdata 7/32 operating package, OS/32MT.

The system design did not allow for any recovery capability. The only back-up capability was provided by daily copying of all data and index files to magnetic tape.

NAVDAC also considered that the system was being developed in an excessively fragmented fashion. Although the original four module approach was acceptable, fragmentation of design was resulting because difficult aspects of certain modules were being transfered to later module development or formed into a separate module.

NAVDAC also addressed the fact that no contractor or Navy personnel with adequate hardware experience, in general, and Interdata hardware experience, in particlular, were included in the project's structure. There were no means to ensure efficient utilization of the ADPE selected.

d. Implementation

One of the major problems with implementation was the decision to rush Module I to NSC Oakland. NAVDAC stated that, " the system was implemented without adequate prior software testing to satisfy an urgent NSC need for an automated aid to their small purchasing crisis. Instead of helping, the system was a burden to NSC management and a resource drain from July 78 through February 1979" [Ref. 15: p.33].

e. Project Monitoring

In reference to project monitoring, NAVDAC indicated that management review actions were not initiated when the project began to experience problems with implementation. They further stated that the ADS development plan was not updated when the planning estimates proved inaccurate. Additionally, they cited the December 1977 Management Plan as no longer current.

They also indicated that although the current APADE II project is over cost and behind schedule, no formalized plan had been developed to remedy the problems and complete the project. In addition, APADE II was an unfunded requirement for FY 80 and out years in the NAVSUPSYSCOM ADP budget submission.

Overall, NAVDAC considered that the problems were of a common origin: execution before or without adequate planning.

2. Recommendtions

The following discussion is a summary of the recommendations from NAVDAC that were provided to the CNO on 10 September 1979.

First, NAVDAC recommended that no APADE II initiatives (development, acquisition, or implementation) be taken prior to completing the following:

1. A major revision to the APADE II ADS development plan,
2. Performance analysis and benchmark testing of hardware configuration at NSC Oakland to accurately identify the hardware requirements that have only been estimated, and
3. A review of the FD/DRD prior to further development with a Design Review Board performing a final review.

It was also recommended that APADE II FY 80 and FY 81 budgeting requirements be prepared as quickly as possible for the Chief of Naval Material's (CHNAVMAT) consideration.A third recommendation was to continue with software development and documentation through the completion of Module IIA. In addition, it was recommended to implement Module IIA at the current prototype sites, and at limited additional NAVSUPSYSCOM sites following CHNAVMAT approval of prototype test results.

NAVDAC's fourth recommendation stated that ADP Readiness Reviews at the activities not reviewed should be done and documented for CHNAVMAT approval. Finally, if the CNO should ultimately approve continuation of APADE II development, the following additional recommendations were submitted.

1. Formalize test and acceptance procedures,
2. Premature implementation should be avoided,
3. If software development is continued under contract, the contractor/FMSO relationship should be more formalized,
4. Provide basic and advanced training in capabilities and limitations of TAPS to development programmer/analysts, and

5. Acquire data recovery capability prior to full APADE II implementation.

B. CNO CONSTRAINTS

Subsequently, the CNO reviewed the NAVDAC report and provided recommendations in his letter dated 1 November 1979. This letter placed a number of constraints upon the APADE II, specifically that:

1. Implementation of Module IIA would be restricted to the two prototype sites, NSC Oakland and NRCO Washington, D.C. and
2. There would be no further development, beyond module IIA.

These two constraints would remain in effect until the following conditions were satisfied:

1. Submission and approval of a new ADS plan including a cost/benefit analysis contrasting in-house vs contractor development,
2. Completion of a hardware sufficiency analysis to determine hardware type and size requirements for each site,
3. Update of the APADE II FD and DRD following a detailed review of these documents, and
4. Preparation and submission of APADE II FY 80 and FY 81 budgetary requirements for CHNAVMAT's consideration.

C. SUMMARY

The current redesign effort is applying the lessons learned from APADE I and II to a Life Cycle Management approach developing a totally integrated and exportable automated procurement system. The modular development and

design approach has been discontinued. The hardware requirements are presently being paralleled with the development of a project to provide new hardware to the major stock points. This project is designated as Stock Point Logistics Integrated Communications Environment(SPLICE). The software currently used will be utilized only if it is compatable with the new hardware and meets the redesign requirements statement.

The new APADE system will apply the capabilities of automated data processing, automated word processing and printing, integrated to the extent permitted by current technology. The new APADE will provide a standardized procurement data processing system designed to provide:

1. Document control,
2. Management and Buyer support information,
3. Automated document and report preparation, and
4. Interdependent system support.

As previously mentioned, the redesign effort is being performed under contract with Booz-Allen. Implementation is currently estimated for March 1983.

VI. CONCLUSIONS

For approximately the last 35 years, the U.S. Navy has been involved in developing and implementing automated data system (ADS) within their organization. However, it has only been within the past few years that the Navy has successfully avoided the major pitfalls associated with developing and implementing these systems.

The major factors contributing to improved management decisions within ADS development and implementation are historical knowledge, improved technology, and increased education in this rapid expanding field. This has lead to a change of philosophies among the personnel tasked with development and implementation of ADS, in addition to improved regulations that provide clear and concise guidelines for these personnel.

One article which provides an excellent view of the ADS development process within the Navy was published in 1976 by Rear Admiral Frank S. Haak. The article entitled, "Brainware versus Hardware" presented six major sequential phases for the development of ADS within the U.S. Navy. They were:

1. Planning,
2. Technical Development,
3. Hardware Acquisition,
4. Programming,
5. Installation, and
6. Maintenance.

The planning phase is initiated by identifying the ADS in terms of content, scope, boundaries and external interfaces. This will lead to the system's performance

parameters and characteristics coming into focus. At this time, alternative concepts, designs and technical approaches require evaluation to determine their feasibility and relative effectiveness in satisfying the system requirements. Technically feasible alternatives should then be subjected to an economic analysis for selecting the optimum system. The planning phase should provide the following products:

1. A well-defined concept for an automated data system capable of satisfying the particular operational requirements in a manner consistent with established procedures,
2. An evaluation of technically feasible alternatives for implementing the ADS concept to achieve the best possible balance between capabilities and cost, and
3. An ADS development plan which identifies time schedules, resources, and management measures necessary to convert the concept into an operational capability via the selected development approach [Ref. 18: p.14].

Admiral Haak indicated that short cuts in this phase would probably increase the risk of serious performance and economic penalties during the development, operation, and maintenanceof the ADS.

Designing the ADS initiates the technical development phase. It requires an "explicit definition, organization, and structuring of the data system configuration capable of performing all processing functions" [Ref. 18: p.15]. Following the designing of the ADS, formulation of detailed characteristics, performance requirements, and configuration criteria for a compatible computer system should be completed. Products of this phase should include:

1. A comprehensive design for the full-scale ADS,

2. A functional description of the ADS which identifies the manner in which the design will satisfy the requirements of the ADS sponsor,
3. Detailed specifications for all data bases, files, application programs and software interfaces,
4. ADP equipment specifications for use in the selection of appropriate general purpose computer systems for the ADS, and
5. A revised development plan reflecting any significant changes and refinements in the milestones schedules, resources, requirements, and estimated benefits presented in the original ADS development plan [Ref. 18: p.16]

Upon determining that new computer hardware is required, proposals are then solicited. The hardware acquisition phase should result in a particular computer configuration which has been thoroughly evaluated, tested, and selected on the basis of both performance and cost.

The programming phase is divided into five sequential tasks. They are:

1. Analyzing specifications to identify each program for structuring,
2. Coding into programming language,
3. Preparing test data and organizing test routines to detect possible errors,
4. Testing each unit, and
5. Documenting the program. [Ref. 18: p.16-18.]

After completing these five task, system integration is performed by joining individual programs into organized modules. The analysis, coding, test planning, and testing is reported and recorded as integration is performed. This phase should produce the following products:

1. Computer programs which perform all functions as specified in the ADS requirement statement,
2. Documentation for proper operation and maintenance of the ADS, and
3. Complete set of test data. [Ref. 18: p. 18.]

The installation phase envolves the testing, final acceptance and certification, and installation of the ADS. The testing demonstrates that the ADS operates in an effective and reliable manner and conforms to the ADS requirements and objectives. When a ADS is designed for more than one site, the test will be designed and conducted as a prototype evaluation.

The maintenance phase is the last phase. It consists of the technical support required to eliminate programming errors and provide system enhancements. This function is usually best performed by the activity which designed and developed the system.

Only after reviewing Admiral Haak's article does a full appreciation for the scope of the development effort formulate. By comparing the APADE II project and the development process as outlined above, the underlying reasons for APADE's delay and limited success become more apparent. The majority of the reasons have been addressed in NAVDAC's report to CNO. However, there are two other factors which, in this researcher's opinion, contributed to the limited success of the project.

Although all activities within the procurement process are governed by the same laws and regulations, each activity interprets those guidelines in a slightly different manner. In addition, their procedures for performing the procurement process may vary according to prescribed local directives.

Admiral Haak stated, "Special care must be taken to define the detailed procedural content of a proposed ADS and

to examine its interrelationships with the functional systems and standard operating procedures employed within the command. If the proposed procedures deviate from some prescribed standard system, it is prudent to propose a change to the standard or obtain a waiver from the appropriate senior before proceeding. If the procedures cannot be defined in explicit, formal detail, they simply cannot be automated anyway" [Ref. 18: p.13].

Functionally, the procurement process could be described in detail; however, the local operating procedures utilized by the various NFCS activities altered the process to meet individual command requirements. The ADS was to be used by all designated activities, not tailored for each individual command. Prior to the development of the ADS for APADE, an extensive planning analysis of the various procedures employed should have been undertaken. Additionally, the need to standardize the procedures among the users should have been evident. An initial indication of this occurred during FMSO's evaluation of automated systems used by NFCS activities. None of these systems were exportable because they were not comprehensive and designed in a different manner to suit just one activities requirements. This fact should have clearly indicated that there was no standard system among the activities.

The environmental conditions during the development effort of APADE II also impacted upon the process. One reason previously addressed was the changing of policies within the Navy's ADP program. The initial development efforts were most likely acceptable because, similar systems were being developed in the same manner. However, as time progressed, development philosophies began to be refined and a new method of ADS development evolved.

Another reason was the sense of urgency for the automation of the procurement process. Faced with increasing procurement actions and personnel reductions combined with the need for improved procurement information, APADE appeared to provided the best solution to overcome these problems. In an effort to provide this system to the activities, management decisions and planning were unrealistically expedited.

Although the APADE II project is a good example of how not to develop and implement an ADS, it provides valuable insight for managers to apply in developing and implementing future automated data systems. As long as the same mistakes are not continually repeated, progress will be made in the effort to automate the procurement process.

APPENDIX A

PROCUREMENT INPUT, OUTPUT, AND REPORT DOCUMENTS

The following are examples of input documents received by the NSC's and NRCC's:

1. Standard Form 129, "Bidders Mailing List Application",
2. DD Form 633, "Contracting Pricing Proposal",
3. DD Form 1149, "Requisition and Invoice/Shipping Document",
4. DD Form 1348, "Single Line Item Requisition Document (Manual)",
5. DD 1348M, "Single Line Item Requisition Document (Mechanized)",
6. DD Form 1348-1, " Single Line Item Release/Receipt Document",
7. DD Form 1348-6, "Non-NSN Requisition (Manual)",
8. DD Form 1594, "Contract Completion Statement",
9. NAVCOMPT Form 2276, "Request for Contractual Procurement",
10. NAVSUP Form 1153, "Request for Purchase Action",
11. NAVSEA Form 4700/2, "Job Material List (JML)",
12. Shipment/Performance Notification,
13. Notification of Payment,
14. Letter/Message Purchase Request,
15. Material Request, and
16. Automated Bid Sheets.

The following is a list of some of the procurement output documents distributed by NSCs and NRCCs:

1. Standard Form 18, " Request for Quotations",
2. Standard Form 26, "Award/Contract",

3. Standard Form 30, "Amendment of Solicitations/Modification of Contracts",
4. Standard Form 33, "Solicitation, Offer, and Award",
5. Standard Form 36, "Continuation Sheet",
6. Standard Form 98, "Notice of Intention to Make a Service Contract and Response to Notice",
7. Standard Form 99 Notice of Award of Cotract",
8. Standard Form 1034, "Public Voucher for Purchases and Services Other than Personal",
9. DD Form 1155, "Order for Supplies or Services/Request for Quotations",
10. DD Form 1384, "Transportation Control and Movement Document",
11. DD Form 1499, "Report of Individual Contract Profit Plan",
12. DD Form 1594, "Contract Completion Statement",
13. DD Form 1501, "Abstract of Bids",
14. DD Form 1524, "Pre-Award Survey of Offerors",
15. DD Form 1707, "Information to Offerors of Quoters",
16. NAVMAT Form 4380/1, "Labor Surplus/Small Business Set Aside",
17. Assignment to Contract Administration Activity,
18. Best and Final Notification,
19. Bidder's Lists,
20. Bid Verification, Blanket Purchase Agreement (BPA)/Basic Ordering Agreement (BOA),
21. Business Clearances (Pre and Post),
22. Buyers' Draft Sheet,
23. Navy Chief of Information (CNINFO) New Release,
24. Commerce Business Daily Synopsis (before and after award),
25. Contract Review Board Approval Request,
26. Cure Notice,

27. D&F (Determination and Findings),
28. Letter Contract,
29. Non-Personal Services Questionnaire,
30. Non-Standard Procurement Notification,
31. Notice of Intent to Exercise Option,
32. Notice of Termination,
33. Notice to Unseccessful Offerors,
34. RAN (Request for Authority to Negotiate),
35. Request for Audit,
36. Request for COTR/Ordering Officer Assignment,
37. Request for EEO Compliance Check,
38. Request for Latest Collective Bargaining Agreement,
39. Request for Non-Personal Services Statement,
40. Request for Ordering Data,
41. Request fo SBA for Certificate of Competency,
42. Request for Sole Source Statement,
43. Request for Statement of Urgency,
44. Request for Technical Evaluation Factors,
45. Show Cause Letter,
46. Stop Work Order, and
47. UADPS_SP Update Transactions.

The NSCs and NRCCs produce , among others, the following reports:

1. DD Form 350, "Individual Procurement Action Report",
2. DD Form 1057, "Monthly Procurement Summary by Purchasing Ofice",
3. NAVSUP Form 80, "Purchase Statistics",
4. Small and Disadvantaged Business Utilization Report,
5. Monthly Procurement Administrative Leadtime Report,
6. Letter Contract/Other Unpriced Order Report,
7. Uniform Management Report, and
8. Monthly Procurement Backlog Report.

APPENDIX B

COMMAND PLAN #338

COMMAND PLAN APADE

REVISED April 1977

1. Organizational Element:

Deputy Commander, Procurement Management.

2. Goal Statement:

To provide an automated procurement management system to major field procurement activities.

3. Naval Supply Systems Command Objectives Supported:

Specific Objectives 80 (Source Data Automation), 35 (Improved Supply Performance), and 92 (Automation of Procurement).

4. Statement of Significance:

The APADE project will provide an automated procurement management system to 11 NAVSUP procurement activities and 18 other major field purchasing activities with capabilities for PR/requisition tracking, automated document preparation, and management information reports. The system will also have source data automation capabilities to enable transfer of pertinent procurement data to interfacing, dependent financial and supply data systems without manual intervention. Overall effect will be to improve field procurement function, reduce cost of procurement operation, reduce procurement administrative leadtime, provide more responsive support to NFPS customers.

5. Means to Measure Progress Toward Goal Accomplishment:

The NAVSUP Command Plan reporting system will be utilized to monitor accomplishment of this goal.

6. Tasks Which Contribute Toward Goal Accomplishment:

a. Finalize Systems Policy Concept.

b. Develop Systems Design Specification.

c. Identify Hardware Requirements and Software Requirements.

d. Develop requirements documentation.

e. Obtain Hardware requisition approval.

f. Procure Hardware/Software.

Enclosure (1)

g. Test and Implement at NSC Oakland.

h. Implement at remaining NAVSUP commanded activities.

i. Implement at non-NAVSUP commanded activities (18 sites).

7. Description of Activity Goals:

FMSO - Provide analysis, contracting, implementation and maintenance support.

8. Availability of Authority Within Organizational Element to Accomplish Goal:

For NAVSUP commanded activities no additional authority is required. For non-NAVSUP commanded activities authorization will be coordinated with NAVMAT and parent SYSCOM's.

9. Estimated Time for Accomplishments:

NAVSUP commanded activities - 18 months after approval.

Non-NAVSUP commanded activities - 36 months after approval.

10. Relationships Between This and Other Goals Submitted by Organizational Elements:

None.

11. Resources:

a. SUP 02 - 2M/Y.
   SUP 04 - 2M/Y.

b. FMSO 96 - 4M/Y.
   maintenance 1M/Y continuing.

c. $1.3M OPN for 11 NAVSUP activities available FY 77.

d. $1.8M OPN for 18 non-NAVSUP (POM 79).

e. $50 - 75K O&MN $ for contractor support.

Pago 1 of 3

COMMAND PLAN: 338 REVISED APR 1977

	MAJOR TASK		1977 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1978 JAN	
1.	FINALIZE SPC	SUP 02	→										
2.	DEVELOP SDS	FMSO		→									
3.	IDENTIFY HARDWARE AND SOFTWARE REQUIREMENTS FOR SDS	FMSO CTR			→	→							
4.	DEVELOP REQUIREMENTS DOCUMENTATION	FMSO CTR				→							
5.	OBTAIN HARDWARE ACQUISITION APPROVAL	SUP 044					→						
6.	PROCURE HARDWARE/SOFTWARE	SUP 044/ 02 FMSO						→	→				
7.	TEST AND IMPLEMENT AT NSC OAKLAND	CTR FMSO SUP 044								→	→		
3.	IMPLEMENT AT NSC NORFOLK	FMSO SUP 044										→	

ROGRAM PLAN—NAVSUP FORM 2611 (7-66)

COMMAND PLAN: 338 REVISED APR 1977 1978

	MAJOR TASK		FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT		
9.	IMPLEMENT AT NRPO WASHINGTON	FMSO SUP 044	→										
10.	IMPLEMENT AT NRPO PHILADELPHIA	"		→									
11.	IMPELEMENT AT NSC SAN DIEGO	"			→								
12.	IMPLEMENT AT NRPO LONG BEACH	"				→							
13.	IMPLEMENT AT NSC PEARL HARBOR	"					→						
14.	IMPLEMENT AT NSC CHARLESTON	"						→					
15.	IMPLEMENT AT NSC PUGET SOUND	"							→				
16.	IMPLEMENT AT ASO	"								→			
7.	IMPLEMENT AT SPCC	"									→		

ROGRAM PLAN—NAVSUP FORM 2611 (7-66)

COMMAND PLAN: 338 REVISED APR 1977

Page 3 of 3

	MAJOR TASK		NOV 1978			APR 1980		
18	IMPLEMENT NON-NAVSUP COMMANDED ACTIVITIES	FMSO SUP 044	——	——	——	→		

PROGRAM PLAN—NAVSUP FORM 2611 (7-66)

APPENDIX C

APADE II SYSTEM FUNCTIONAL REQUIREMENTS

Procurement Tracking

The APADE II system shall provide on-line request and retrieval functions to support the procurement tracking process. These functions shall provide interactive terminal access to the Purchase Master File disk records giving information regarding the general purchase request status.

Procurement Record/History

The APADE II system shall support the functions of procurement records and history by providing a Purchase Master File on disk containing a record for each active procurement in process. A Purchase Master File record shall be initiated each time the Procurement Branch begins a procurement activity. As the activity moves through the various stages of procurement, the corresponding records of the Purchase Master File shall be updated via local or remote interactive CRT and batch modes.

Document Generation

The document generation function shall imclude a combination of on-line interactive CRT data entry and periodic batch operations. Specific Navy and other military regulations shall be entered via this function and stored on disk by the system. This information shall then be available for retrieval and editing along with the entry of specific text for the preparation of the various formal procurement documents.

Management Information

The management information function shall provide a combination of interactive on-line data entry and batch oriented operations. The procurement office management requires the ability to request information/data from the APADEII System on various aspects of the procurement office processing (auditing) cycle plus the ability to generate periodic batch reports. The reports may then be utilized by internal procurement office personnel and external Navy commands for purposes of reviewing each procurement office's progress, outstanding purchase requests, situations, and expenditure data.

Telecommunication Interface

The telecommunication interface function shall provide the ability for the APADE II System to communicate via common carrier (telephone facilities) services with external U.S. Navy Financial and Supply computerized Data Systems. This interface shall be utilized by the Navy Procurement Office for purposes of exchanging (input or output) APADE II data/information with certain other Navy facilities.

APPENDIX D

APADE II INITIAL TASK ORDERS TO GSA-IDSF

Task One - System Specifications(SS)

The System Specification is written to provide detailed definition of the system functions, to provide ongoing analysis, and to define in detail the facilities to be utilized to accomplish the interfaces. All programs necessary are described. The SS shall be written according to NAVSUP PUB's 506, 507, and 508 and as such will be based on the APADE II Functional Description (FD). The SS will be reviewed by FMSO for consistency with the FD. The approved SS will be the basis for further system development. If modifications are found to be appropriate to the SS, all such changes shall be made by the development contractor only on written approval by NAVSUP.

Task Two - Data Base Specifications (DS)

The DS describes the storage allocation and data base organization that provides the basic design data necessary for construction of system files, tables, dictionaries and directories. The DS shall be written according to NAVSUP PUB's 506, 507 and 508 and as such shall be based on the FD, RD, SS, and PS. The DS will be subject to FMSO approval and once approved all changes shall be reviewed and approved by FMSO.

Task Three - Test Plan

Test plans will be written for two levels of formal testing. The upper level of test plan shall be based on the FD objectives and requirements while the lower level shall be based on the SS and its identified requirements. The

test plan shall be reviewed and approved by FMSO. The Functional Test Plan on upper level test plan shall test the system from the user viewpoint and will demonstrate system inputs and outputs at the user level. The program test plan shall test the system from the maintainer's viewpoint and shall demonstrate consistency between delivered documentation and the system code that is used.

Task Four - Program Specification (PS)

The PS describes the program design in sufficient detail to permit program production by the coder. References for the PS are the FD and the SS. The PS shall be written according to NAVSUP PUB's 506, 507 and 508. The PS shall be submitted to FMSO for review of consistency with the SS and FD. Changes which do not effect those higher level documents may be made by the development contractor at his discretion but must be submitted for review by FMSO.

Task Four - Program Coding and Testing

The individual programs identified in the PS shall be coded in a structured manner according to the design of the program specification. After successful compilation each shall be tested by a test designed by the coder. After successful testing the development contractor's quality assurance manager shall review the programmer's notebook, the code and test results to ensure that the code meets the PS requirements.

Task Six - System Integration

The individual programs will be integrated into a unit and tested according to the Program Test Plan. After completion the software program package and test result will be reviewed by the development contractors quality assurance manager. The system operations and functions shall then be tested according to the Functional Test Plan and the results

reported to FMSO by the development contractor's quality assurance manager. The Functional Test will be made with FMSO representation present.

Task Seven - Acceptance Testing

The software program package shall be installed at NSC Oakland and operated by Navy personnel for a one month period. The Navy shall log all software incidences during the period and the development contractor shall correct any deficiences and modify the system documentation correspondingly. When all deficiences are corrected an additional two week test shall be conducted to ensure correction of the 30 day test deficiences.

Task Eight - User Manuals

A complete set of user documentation for each implementation site (35) shall be provided by the contractor. This documentation will include detailed desk procedures for purchase personnel and an executive users manual for purchase management personnel. This executive manual will provide summary information such as reports available, options available, summary outline for system operation, etc.

Task Nine - Training

Training for the user and for the software maintainer shall be performed by the development contractor. User training shall be conducted for complete operation by procurement buyers and clerks. Additional material will be presented to guide the user in obtaining the full use of hardware and software maintenance support. User training shall be based on the User Manual and shall consist of 16 hours of on-site instruction at NSC-Oakland. Software maintenance training shall consist of 32 hours of classroom instruction. Software maintenance training shall be based

on the complete software program package, all system documentation (FD, RD, SS, DS, PS).

Task Ten - Quality Assurance Program

The development contractor shall designate a quality assurance manager who shall review all documentation for consistency and completeness. He shall be responsible for assuring that all documents ate consistent with the final product and shall review all changesto the FD, RD, SS, DS, and PS. He will prepare the functional and program test plans and shall review individual code tests prior to their integration into the system. He will perticipate in the system testing and shall prepare test reports on the results.

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